DEPARTMENT OF CITY PLANNING 100 LARKIN STREET · SAN FRANCISCO, CALIFORNIA 94102

DRAFT ENVIRONMENTAL IMPACT REPORT

180 MONTGOMERY STREET

CASE NUMBER EE 76.162

Review Period

April 8 - May 12, 1977

DEPARTMENT OF CITY PLANNING
SAN FRANCISCO

DEPARTMENT OF CITY PLANNING 100 LARKIN STREET · SAN FRANCISCO, CALIFORNIA 94102

DRAFT ENVIRONMENTAL IMPACT REPORT

180 MONTGOMERY STREET

CASE NUMBER EE 76.162

Review Period

April 8 - May 12, 1977

DEPARTMENT OF CITY PLANNING
SAN FRANCISCO

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (continued)

I. SUMMARY

Corwin Booth and Michael T. Hall propose to develop a high-rise office building on the southeast corner of Bush and Montgomery Streets. The building would consist of a lobby/retail/plaza ground floor level below a 25- to 28-story[1] office tower. The building would provide approximately 349,000 net square feet of rentable office space and 4120 net sq ft of retail space; total gross occupied building area (excluding mechanical service floors) would be approximately 382,000 sq ft.

Population of the building is estimated at between 1360 and 2360. The developer's marketing intent and present tentative tenant commitments indicate the occupants would tend to be smaller professional firms active in the central finance and administrative district.

The project would take approximately 20 months to construct, and is expected to be completed during late 1979. It would require demolition of existing structures on the three assembled lots of the site.

The proposed building would be located in the core area of the finance and administrative district of San Francisco's downtown area. This is an area already characterized by existing high-rise office buildings, and continued development of new buildings. The proposed project would be part of this general trend in the finance and administrative district, as is the First California Bank Building (under construction) and the proposed 595 Market Street Building (approved by project uncertain).

---

1. Ultimate height is not presently determined, but impacts are calculated for a 29-story building as a conservative analysis.

The proposed project would be expected to have the following impacts on its natural and human environmental setting:

- Land Use — The office space that would be added to the downtown inventory by the project would meet an existing demand without adversely affecting the general market condition for office space of this category.
- Economic — The approximately 1360 to 2360 persons that would be occupying the proposed building would represent an increase in downtown office-related employment. Approximately 220 person-years of construction labor would be required to build the project.
- Public Revenues — The assessed value of the site and its buildings would increase from $930,000 existing, to $5,050,000 proposed, resulting in additional property tax revenues. Additional business and sales tax revenues would be proportionate to the extent this project represents growth in downtown activity.
- Public Services — Demand for fire, police, utility, and waste services would be increased by this building.
- Transportation — Home/work travel by occupants of the proposed office building are estimated at 955 vehicle round trips per day by private auto and 984 person round trips per day by public transit in 1980. Traffic count data indicate this would increase flow as a percent of capacity by approximately 5%. The resulting increased transit ridership would not cause any system to exceed its projected capacity. However, without schedule changes, particularly the case with Muni, individual

lines would exceed their capacities during peak periods. During the 20-month construction period the curb lane of both Montgomery and Bush streets would be closed, and the sidewalks relocated under cover.

- **Pedestrian Circulation** — The project would add to the daytime population of the downtown area, which would result in no change in the level of service on the Bush Street sidewalk, but which could result in a reduction in the level of service on the Montgomery Street sidewalk.
- **Microclimate** — The effect on street level winds and comfort would vary with location near the project; winds would be increased close to the site but would decrease along Montgomery Street. Added to increased wind force would be increases in areas in shadow that would result in decreased comfort for pedestrians. The proposed plaza area would be totally in shadow and exposed to winds.
- **Historical and Visual** — The site now contains three low buildings which contribute to the visual and historical character of the finance and administrative district, particularly the neoclassic style E.F. Hutton Building. These buildings would be demolished. Their replacement by a single office tower in conventional contemporary design idiom would change urban scale and character at the site.
- **Noise and Vibration** — During demolition and construction, some discomfort would occur for pedestrians and occupants of nearby buildings from the operation of construction equipment.

Measures adopted to mitigate potential impacts include a decision not to provide auto parking in the building in order to discourage private auto use and generation of air pollutants, increasing the width of sidewalks at the site to accommodate increased pedestrians, the placement of this additional sidewalk area and roughly one-third of the plaza area under cover to shield it from the wind, and the selection of a variable volume air handling system with economizer cycle. Department of Public Works requirements concerning traffic, air pollutants, and noise impacts of construction would be observed, and any special problems will be worked out with the Department.

Alternative sites for the proposed building are limited to the core finance and administrative district by the developer's objective of meeting office space demand in that area. Sites elsewhere would have to be developed in response to different market forces. Alternative sites within the area are limited, and would have impacts similar to the proposed project. The proposed site is presently developed for primarily office uses, with some retail.

II. PROJECT DESCRIPTION

A. OBJECTIVES OF DEVELOPMENT

Corwin Booth and Michael T. Hall propose to develop a 26- to 29-story office building at 180 Montgomery Street. The objectives sought by the proposed project are to meet demand for professional office space in the finance and administrative district[1] and thereby to maximize financial return on the investment in the proposed project and property.

B. LOCATION AND BOUNDARIES

The proposed project occupies the southeast corner of Montgomery and Bush Streets, in the area generally referred to as the finance and administrative district within the central business district (CBD) of the City of San Francisco. The property consists of lots 6A, 6B, and 6C in Assessor's Block 289, and totals 18,580 sq ft in area (see Figure 1). The location within the downtown area is shown in Figure 2.

C. DESCRIPTION OF THE PROPOSED PROJECT

The proposed building is a high-rise office tower between 25 and 28 floors above a single ground floor of lobby and retail space.

The proposed ground floor plan, shown in Figure 3, has a gross enclosed area of approximately 5900 sq ft. This includes a lobby area of approximately 750 net sq ft and two separated retail spaces of

---

1. The finance and administrative district is the area roughly bounded by Market, Powell, and Sacramento Streets. For a map and further description of this subarea, see Arthur D. Little, Inc., Commercial and Industrial Activity in San Francisco: Present Characteristics and Future Trends, (a report to the San Francisco Planning Department), June 1975, p. IV-56, Figure IV-5.

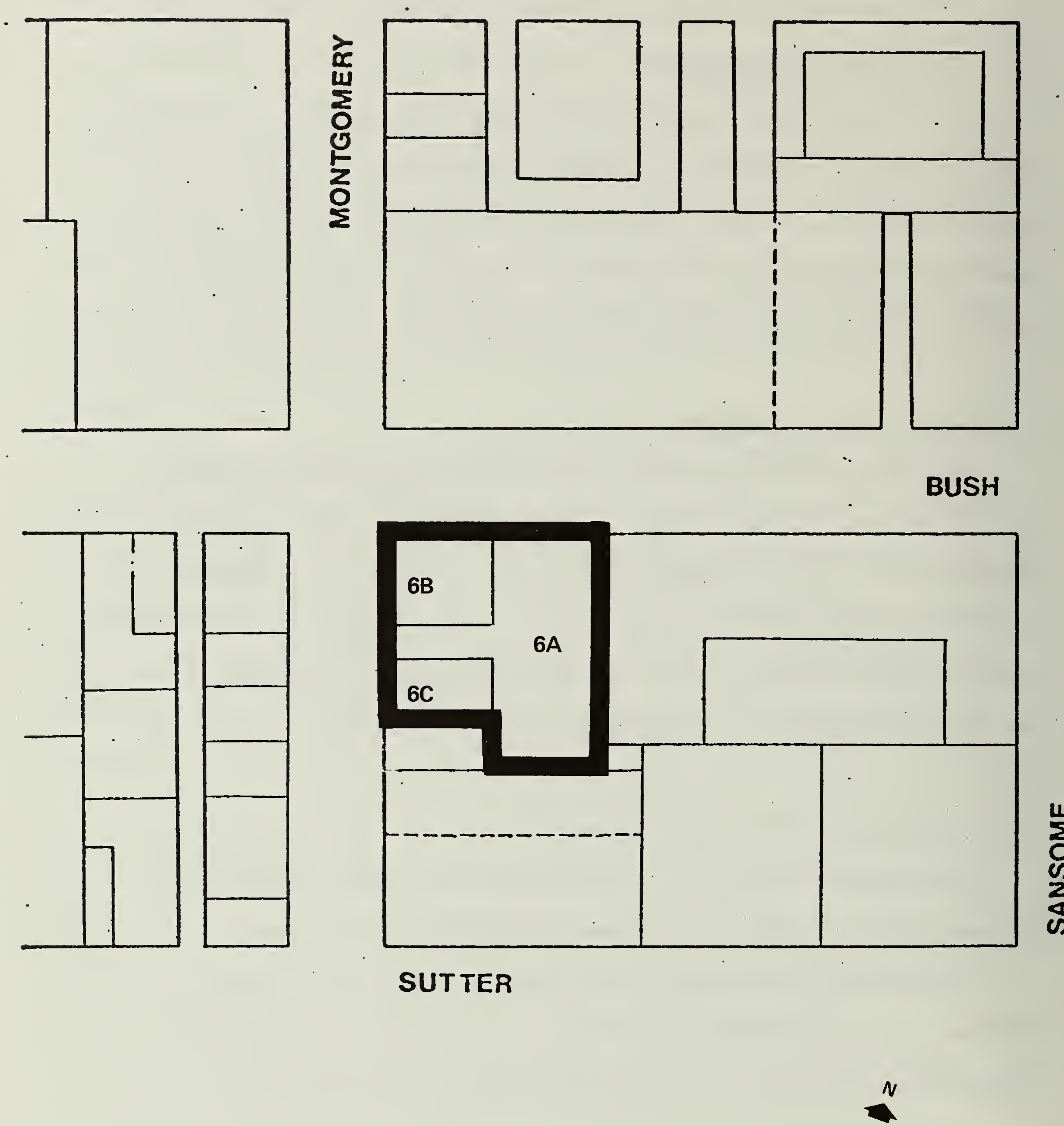
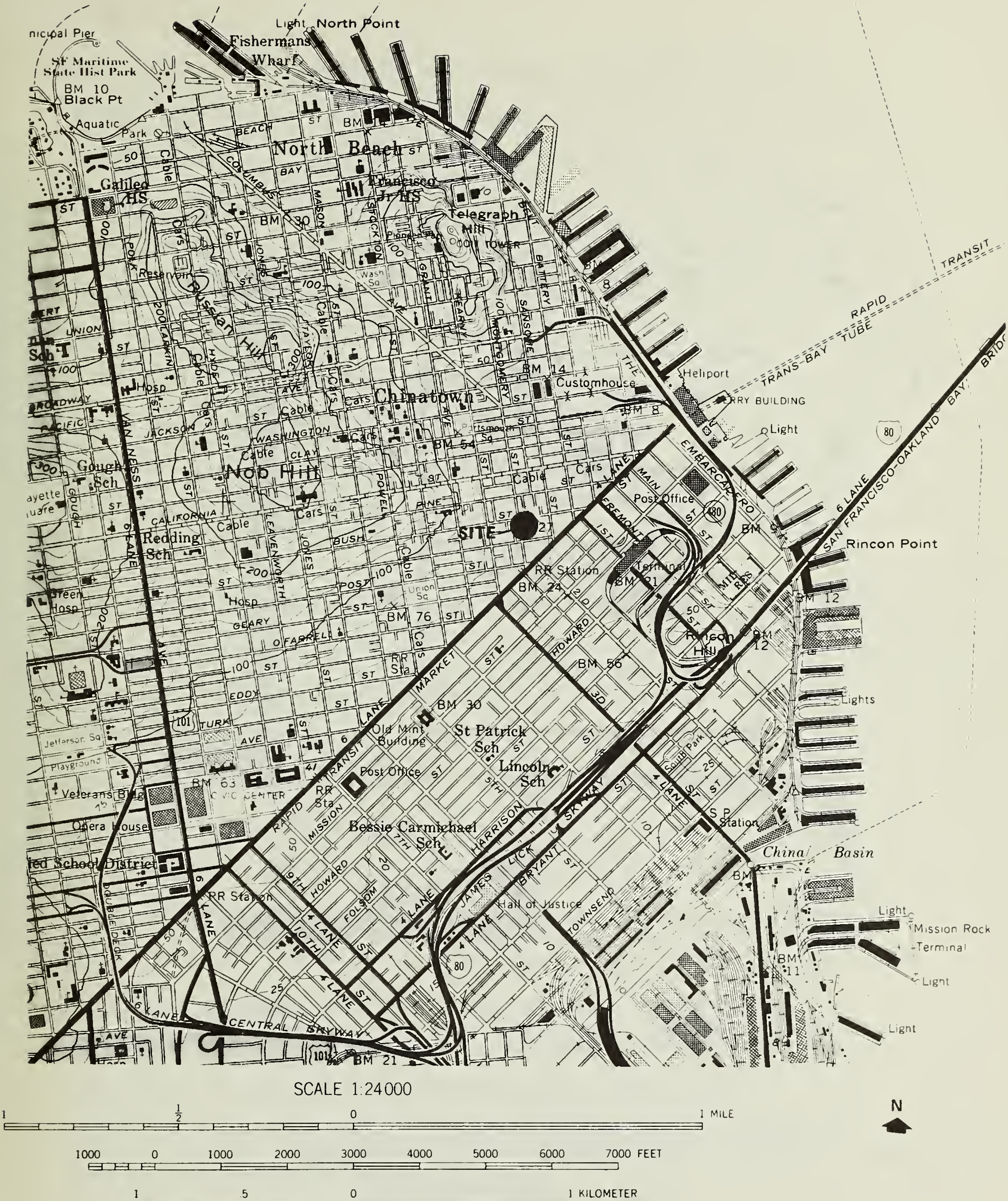
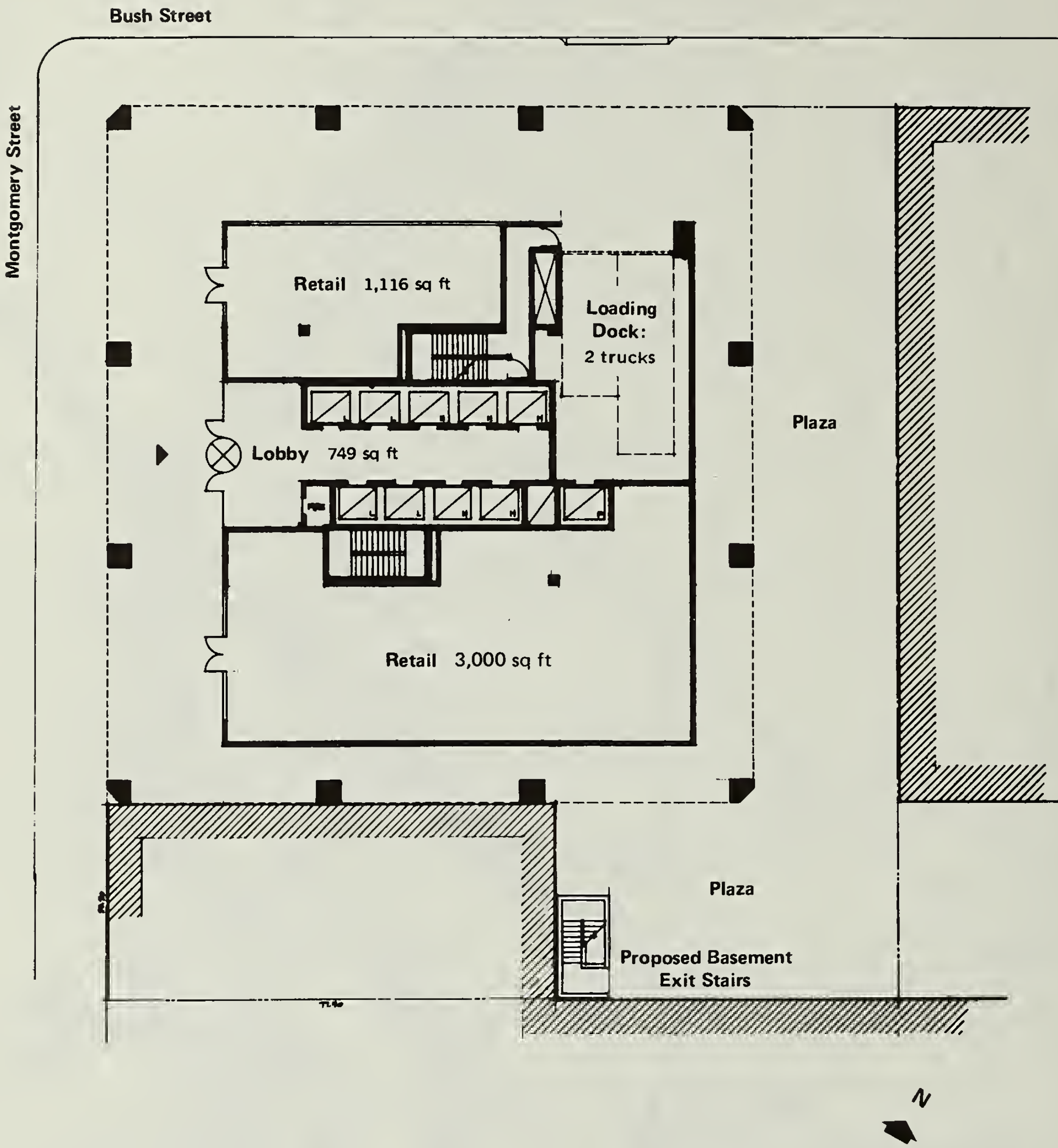


FIGURE 1 PROJECTED PROJECT SITE
(Lots 6A, 6B, and 6C in
Assessor's Block 289)



Source: U.S. Geological Survey, N3745-W12222.5/7.5, 1956, Revised 1968 and 1973.

FIGURE 2 LOCATION MAP



Source: Skidmore, Owings & Merrill, Architects-Engineers.

FIGURE 3 GROUND FLOOR PLAN

approximately 3000 and 1100 net sq. ft. each. No tenants are presently identified for these retail spaces. It is possible that a retail banking unit may occupy the larger of the two spaces, although other sales-oriented activities are anticipated.

Entrance to the office tower would be via Mongomery Street. The Montgomery Street and Bush Street ground floor facades would be set back from the existing sidewalk line roughly 20 feet, to provide for pedestrian circulation. The ground floor facades on the other two sides would also be recessed approximately 10 feet, allowing circulation completely around the building. The building itself would be set back 25 feet from the east property line[1] and a plaza provided for use by building occupants and the public.

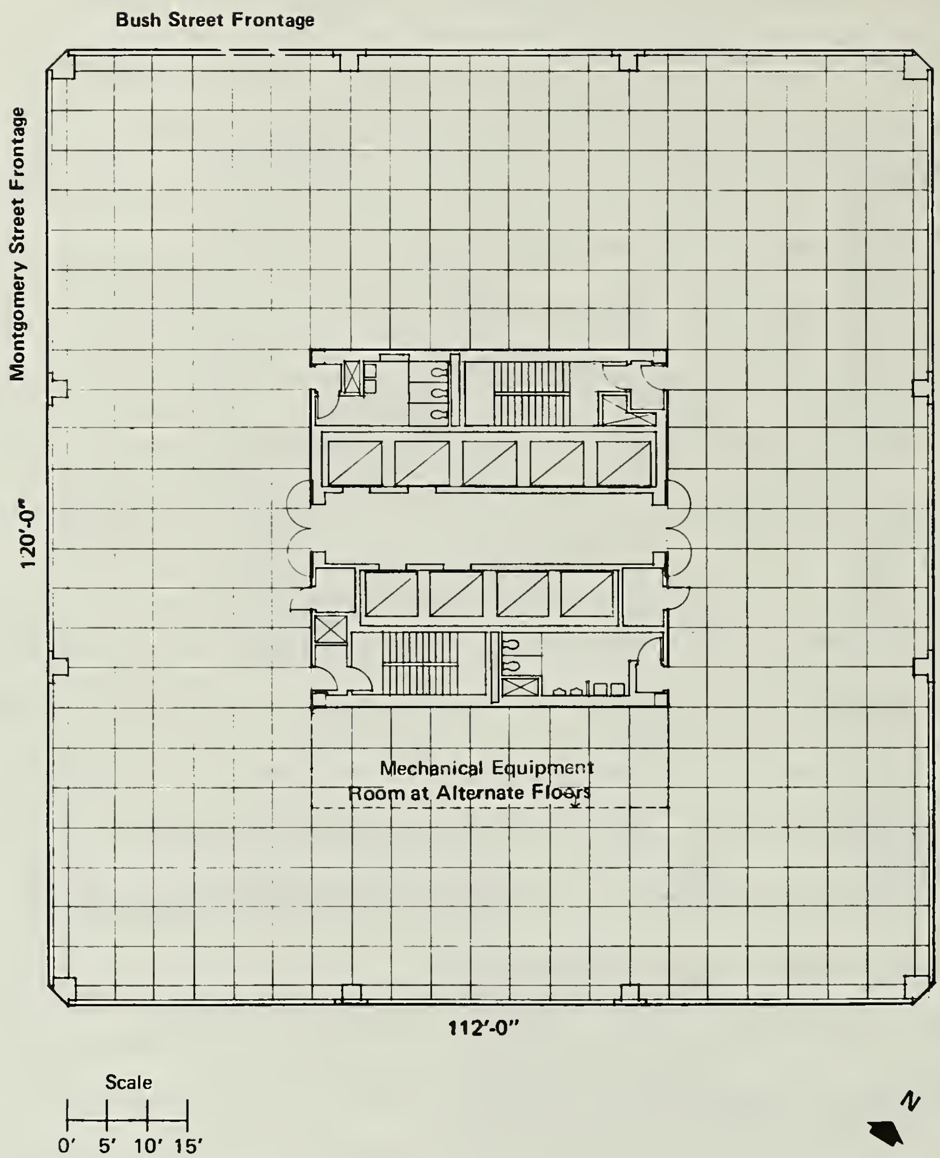
A single basement level of approximately 13,400 sq. ft. and a mechanical level of approximately 13,400 sq. ft. at the top of the tower are anticipated to be occupied by mechanical and building service equipment. A service dock area and parking for two service vehicles would be provided on the north side of the proposed building, accessing from Bush Street. No parking would be provided in the building.

The typical office tower floors shown in Figures 4 and 5 are nearly square rectangles of approximately 13, 400 gross sq. ft., served by a central core of elevators and building support spaces. A typical lower floor net rentable area of approximately 12,400 sq. ft. is expected.

A small pedestrian bridge is proposed between the 19th floor of this building and the adjacent Standard Oil Building. The bridge would connect space to be leased by a present tenant of the Standard Oil Building and would be for the exclusive use of that tenant.

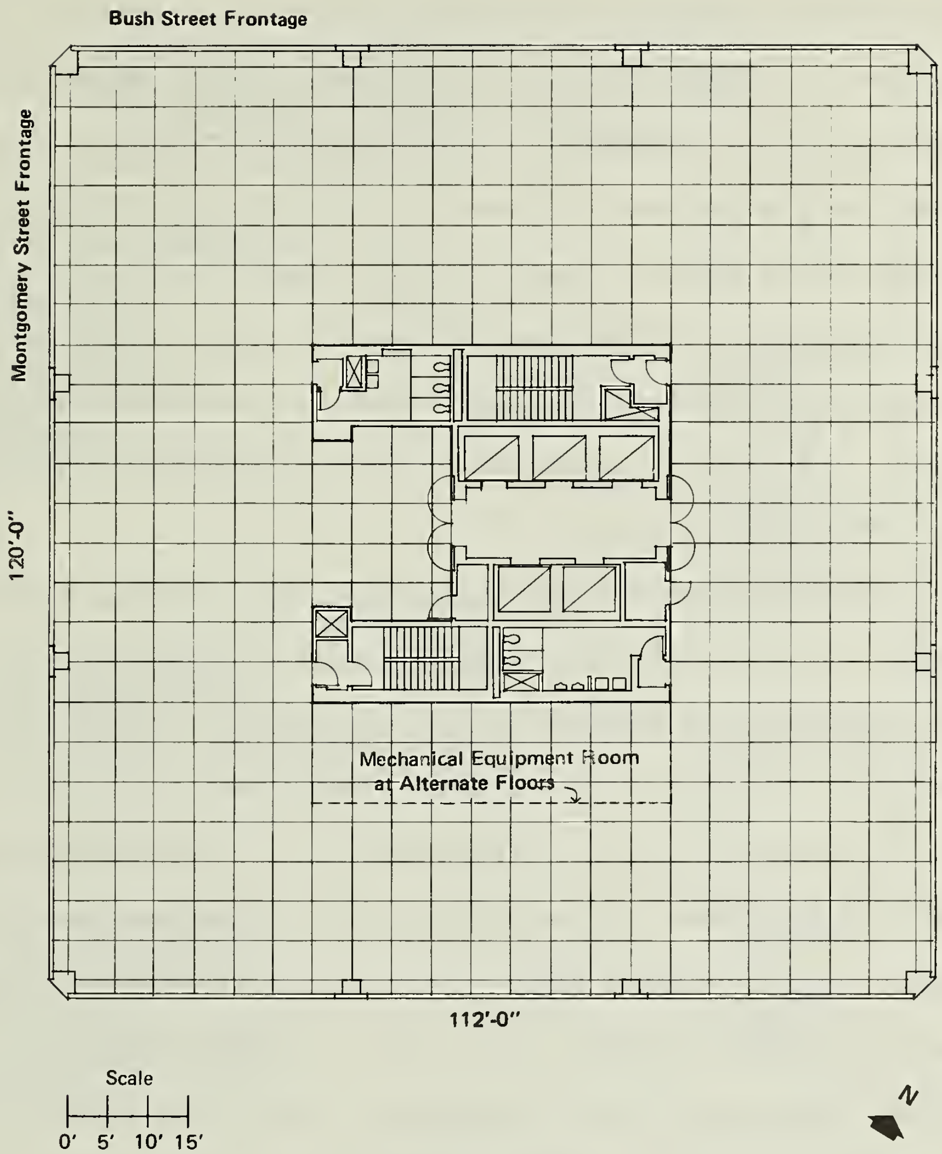
---

1. A deeded air rights easement extends horizontally 25 feet west from the east property line, upward from the roof of the existing Title Insurance Building.



Source: Skidmore, Owings & Merrill, Architects-Engineers.

FIGURE 4 TYPICAL LOW-RISE FLOOR PLAN



Source: Skidmore, Owings & Merrill, Architects-Engineers.

FIGURE 5 TYPICAL HIGH-RISE FLOOR PLAN

The developer anticipates that he will be allowed under the City Planning Code to build to a gross area of approximately 386,000 square feet, based on a Floor Area Ratio (FAR)[1] allowance of approximately 260,000 square feet and a bonus area[2] allowance of approximately 126,000 square feet. This assumes that a bonus allowance of 39,015 square feet will be approved for the proposed plaza as indicated in Figure 3, page 8. If the micro-climate conditions affecting the plaza cannot be mitigated to the City's satisfaction, the building would need to be redesigned to a lower gross area (less 39,015 square feet).

The actual gross area of the occupied 29-story building (but excluding the basement and top level of the building, both occupied exclusively by mechanical equipment and services spaces not counted in FAR analysis) would be approximately 382,000 sq. ft. Of this, approximately 349,000 sq. ft. are planned as net rentable area for office uses and 4120 sq. ft. as net rentable area for retail uses. If only 26 building floors were constructed, the building would have three fewer floors, approximately 40,300 gross sq. ft. less, and approximately 35,700 sq. ft. less of rentable office area, a reduction of approximately 11%. An analysis of the proposed building's area and dimensions based on a 29-story building, is presented in Table 1.

The building would conform in general to planning and zoning requirements relating to the site. The use zoning is "C-3-O" Downtown Office District

---

1. Floor Area Ratio (FAR) is the maximum allowable ratio of the site area to the gross floor area of a building. For example, a FAR of 14:1, as for the proposed building, means that the maximum permitted gross floor area for the building is 14 times the area of the site.

2. Section 122.3 of the City Planning Code provides for floor area bonus if buildings contain certain features such as plazas, setbacks, widened sidewalks, or rapid transit proximity. This floor area is in addition to that allowed by the FAR.

TABLE 1

APPROXIMATE BUILDING AREAS AND DIMENSIONS

Planning Code Allowance and As Proposed
(29 Story Building Proposal)

Floor Area Ratio (FAR) Allowance:*	260,100 sq. ft. allowed
Bonus Area Allowed For:*	
Rapid Transit Proximity	10,500
Multiple Building Entry	13,005
Sidewalk Widening	39,015
Shortened Walking Distance	1,440
Plaza**	39,015
Side Setback	23,025
TOTAL BONUS AREA	126,000 sq. ft. allowed
Total Building Area Allowance	
Floor Area Ratio (FAR) + Total Bonus Area	386,100 sq. ft. allowed
Derivation of Tower Height	
Total FAR + Bonus Allowance	386,100 sq. ft.
Proposed Ground Floor Area =	5,900
Area Remaining for Tower 386,100 - 5,900 =	380,200
Proposed Typical Tower Floor =	13,440
Number of Typical Tower Floors 380,200 ÷ 13,440	28.29 tower floors
Therefore:	
Ground Floor + 28 Typical Tower Floors**	
Total Proposed FAR Building Area =	382,220*** sq. ft.
Allowed Area not used =	3,880 (1.00% of Total)

TABLE 1 (continued)

Site Coverage (building floor area ÷ site area)

Proposed:	13,440 ÷ 18,579 =	72%
Permitted:		100%

Maximum Dimensions	Proposed	Permitted
Height Above Grade	410 ft.	500 ft.
Building Length	120 ft.	170 ft.
Diagonal Dimension	165 ft.	200 ft.

Building Area Proposed

Total Occupied Building Area	382,220***
Total Gross Area (including mechanical/ service floors)	409,000***
Net Rentable Area	353,302
Office	349,186
Retail	4,116

* The FAR and Bonus Area calculations are given in Appendix B.

** Bonus allowance anticipated by developer based on proposed plaza. City approval is uncertain at this time.

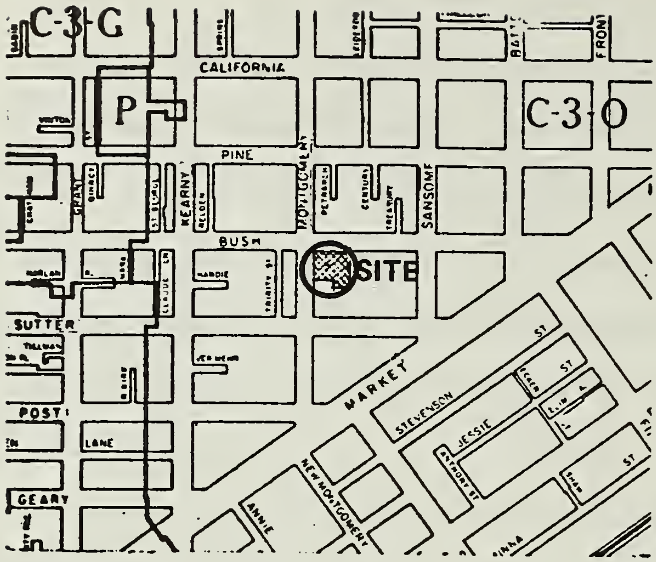
*** Building includes one roof level floor and one basement of approximately 26,900 square feet total, housing mechanical/building service functions not included in FAR consideration. Penthouse enclosure on roof covers the protrusion through the roof of elevator shafts and equipment.

within which proposed office and retail uses are permitted. It is in a "500-I" height and bulk zoning district which permits a maximum building height of 500 feet; above 150 feet in height a maximum length dimension of 120 feet and a maximum diagonal dimension of 200 feet is permitted. A conditional use permit would be required for the small bridge proposed between the 19th floors of the proposed building and the adjacent Standard Oil Building. Zoning for the site and surrounding area is shown in Figure 6.

The proposed architectural design of the building exterior is an expressed rectangular structural grid, with bronze solar glass and light colored surface materials. Clear glass will be used on the ground floor and retail areas. The form of the building is a rectangular office tower with a setback ground floor level. An elevation of the building is provided in Figure 7 and a section of the building in Figure 8.

The objective of the developer is to construct prime competitive office space in the finance and administrative district for the smaller, professionally oriented firms that comprise a large proportion of the finance and administrative district market for office space. This market is viewed by the developer as having a level of demand and revenue that presents an investment opportunity. Marking of space is now being conducted with preliminary agreements being nogotiated with prospective tenants.

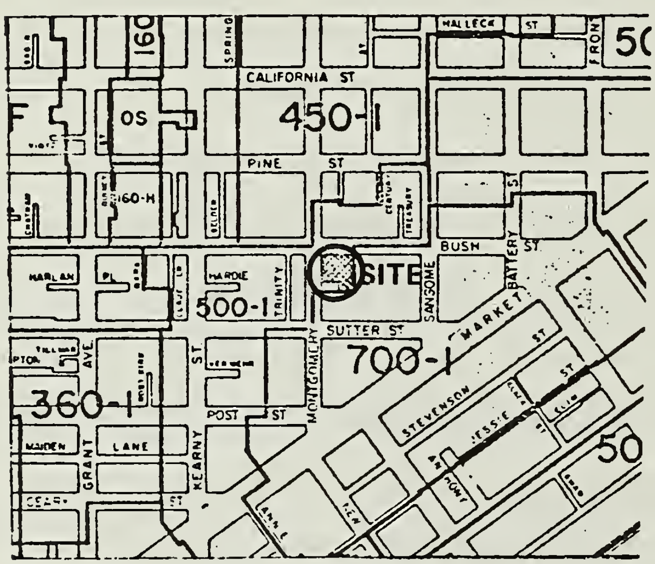
The floor-to-tenant ratio for the use of prime office space varies widely by the character of space and of tenant. The Alcoa Building and Crown-Zellerbach Building, with professional tenants similar to the market proposed forthe proposed project, have overall building densities of about



Use Districts

Key:

C-3-O	Downtown Office
C-3-G	Downtown General Commercial
P	Public



Height and Bulk Districts

Key:

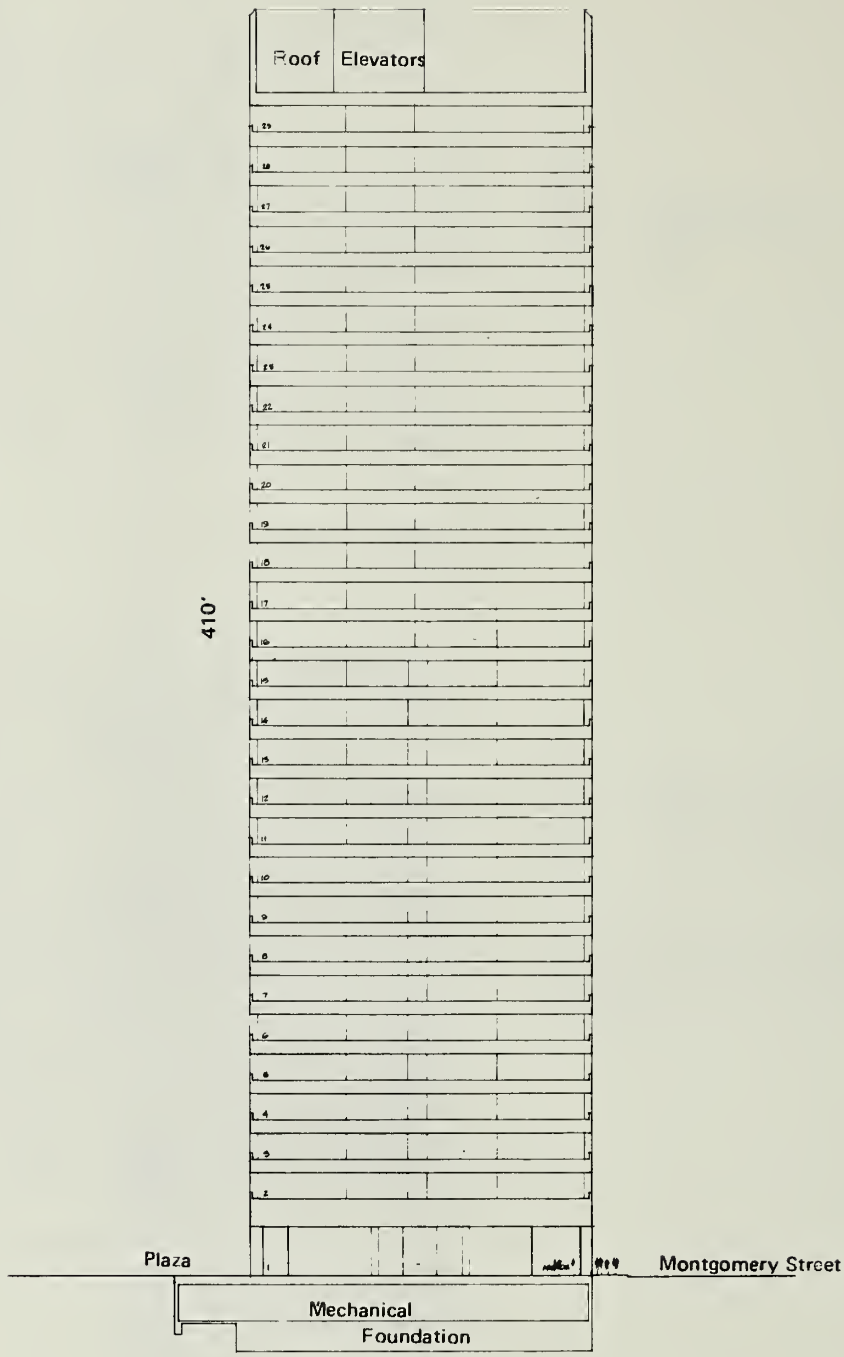
360-I	Maximum Height 360 Feet
450-I	Maximum Height 450 Feet
500-I	Maximum Height 500 Feet
700-I	Maximum Height 700 Feet

Buildings over 150 feet high in all above districts are limited to a maximum of 170 feet length and 200 feet diagonal dimension for portions of structures above 150 feet.

FIGURE 6 ZONING FOR SITE

Source: Skidmore, Owings & Merrill, Architects-Engineers.

FIGURE 7 ELEVATION, MONTGOMERY STREET



Source: Skidmore, Owings & Merrill, Architects-Engineers.

FIGURE 8 SECTION

175 sq. ft. per person. Specific individual offices in these buildings have densities of 250 net sq. ft. or more per person.

Based upon the tenants now tentatively anticipated and committed, the developer estimates that the total occupancy of the building would be approximately 1360 people.

In order to provide a worst case analysis of the impacts of the building, a factor of 150 net sq. ft. per person will be used in this report for calculations, resulting in an assumed building population of 2360.

The building project is in the schematic design state and only broad characteristics are defined. The size of the building is defined as between 26 and 29 floors. Refinements in design and building area may occur as the design is completed. Impacts have been described in this report in general on a conservative, worst case basis; a 29-story building has been assumed for most specific calculations. The final design of the proposed building is subject to possible detailed design review by the city staff and Planning Commission through the discretionary review power of the City Planning Commission.[1]

The firm of Skidmore, Owings & Merrill, Architects-Engineers, San Francisco, has been responsible for preliminary design work to date. The firms of Corwin Booth And Associated Architects would be responsible for completion of design.

The developer and architects presently anticipate that work on the site would begin with demolition of existing buildings in late 1977 and

---

1. Under the charter of the City and County of San Francisco, the City Planning Commission has the power to exercise its sound discretion over any permit application subject to review and approval by the City Planning Department.

TABLE 2

TENTATIVE PROJECT SCHEDULE

Start Date	Late 1977
Dependent upon city permitting and project contracting processes	
Time Requirements	
Demolition	2 months
Excavation	3 months
Foundation	2 months
Framing	4 months
Mechanical, infill, and finish	9 months
TOTAL	20 months
Completion Date	Late 1979

Source: Skidmore, Owings & Merrill, Architects-Engineers.

be completed by the end of 1979, lasting roughly 20 months. A tentative schedule is presented in Table 2. This schedule is dependent upon permitting procedures and project contracting processes.

Construction of the proposed building is estimated by the architects to cost approximately $17,500,000 in 1976 dollars.[1]

---

1. Estimated at the Engineering New Record Index of Building Construction Cost index number 1487, as defined in the December 1976 issue of Engineering News Record.

III. ENVIRONMENTAL SETTING

The site is presently occupied by three older buildings which would be demolished. Those buildings and others near the site are shown in Figures 9, 10, 11, and 12. (See also Figures 1 and 2.)

A. EXISTING BUILDINGS

The site contains three structures on Assessor's Block 289: the E. F. Hutton Building on lot 6B (160 Montgomery Street), the Title Insurance Building on lot 6A (275 Bush Street/148 Montgomery Street), and the Gibraltar Savings Building on lot 6C (140 Montgomery Street).

Since their purchase by the present owner in 1974, these buildings have been available for occupancy on a 60-day lease basis. The tenants at the time of the sales have moved to other permanent locations in the financial district.

The ground floor of the Gibraltar Building is presently occupied by a stationery/art supply store that expects to vacate shortly. Approximately 1600 square feet of the Title Insurance Building are occupied by a dress shop. The remainder of the existing facilities, including all of the E.F. Hutton Building, is vacant.

The buildings do not meet current seismic structural requirements of the city building code nor the requirements of the city parapet ordinance.

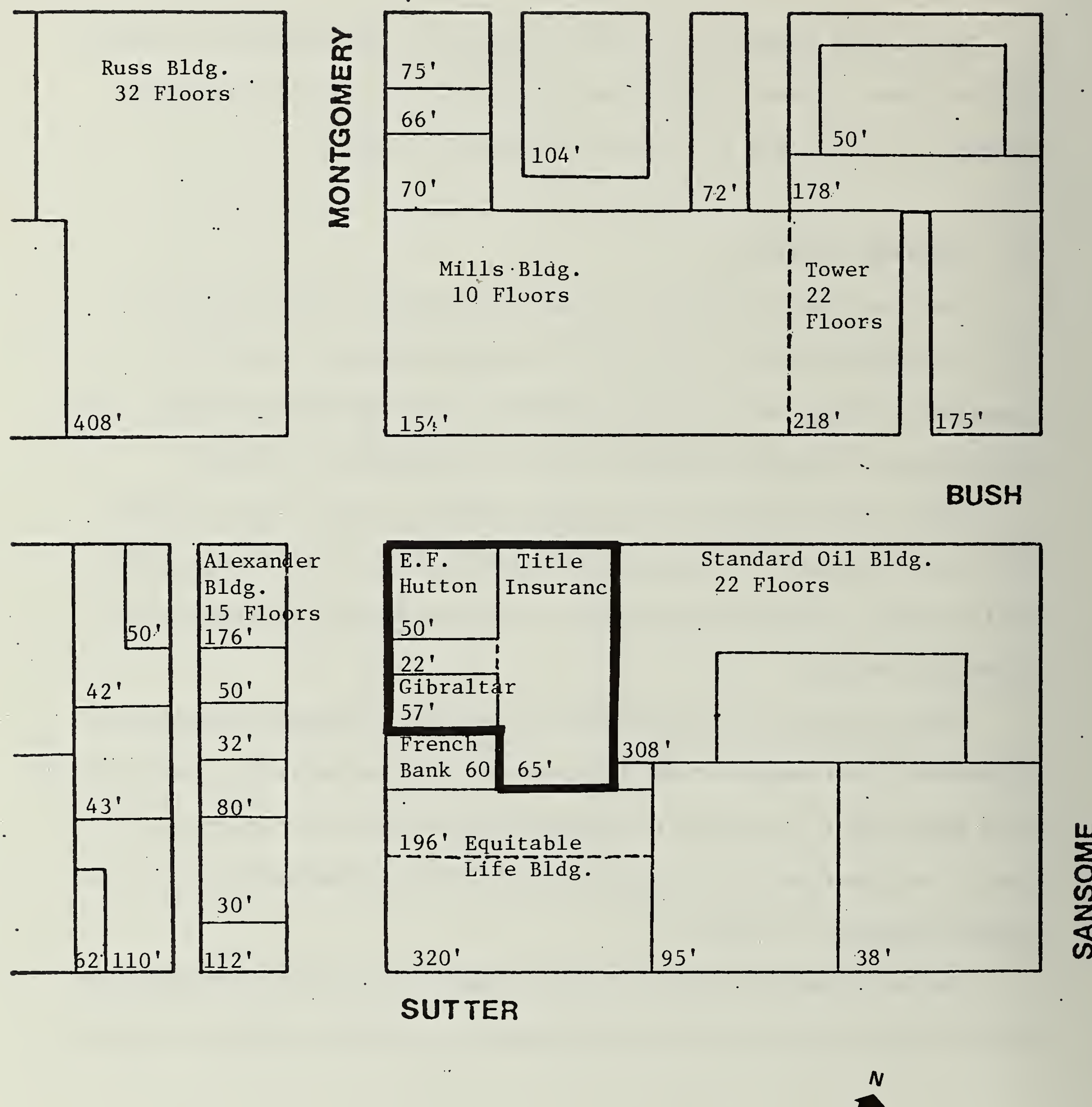


FIGURE 9 PROJECT SETTING, WITH BUILDING HEIGHTS

FIGURE 10 EXISTING E.F. HUTTON BUILDING

FIGURE 11 BUSH STREET VIEW OF EXISTING BUILDINGS

FIGURE 12 MONTGOMERY STREET VIEW OF EXISTING BUILDINGS

Building	Date of Construction	Net Rentable Square Feet	Number of Floors
140 Montgomery Street	1922	11,400	Basement, 4 Floors
160 Montgomery Street	1922	19,396	Basement, 3 Floors
275 Bush Street	1921	31,330	Basement, 4 Floors, + Mezzanine

B. SCENIC AND HISTORICAL ASPECTS

The proposed site is a corner of the principal street of the financial district, seen daily by people in the financial district. Individual buildings near the site and their height are shown in Figure 9.

The E.F. Hutton Building on the project site is a four-story, light-colored concrete building in the neoclassic style,[1] one of the few remaining in the financial district. It occupies the corner lot. The Foundation for San Francisco's Architectural Heritage has reviewed the buildings existing on the site and nearby (see Appendix C). It states:

> "The E.F. Hutton Building is a very good example of low-rise classical buildings of the type that once dominated Montgomery Street. An important building with high visibility."

The Title Insurance Building on the project site is a five-story T-shaped building with a red brick neo-Georgian[2] facade on Bush Street. The Gibraltar Savings Building on the site is of three stories with a remodeled facade, dominated by a three-story high concrete grillwork screen.

---

1. Neoclassic is an architectural style based upon the classic styles of ancient Greece and Rome.
2. Neo-Georgian is an architectural style based on the style developed in England during the Georgian Era, especially the period 1714-1760.

The French Bank Building at 130 Montgomery, adjacent to the site, is a narrow, six-story building with a tall, narrow masonry facade in the art deco style.[1] The Foundation for San Francisco's Architectural Heritage states:

> "The building has fine ornamentation and a very nicely carried out design that works well with the buildings narrow shape. The entrance is dramatically treated and flanked by bas reliefs of muscular figures. The copper (bronze?) spandrels are very beautifully designed with zig zag motifs. Its color harmonizes with its neighbor to the south. There are very few buildings in this style in San Francisco, and this is one of the finest. An important architectural embellishment to downtown. Whatever is built next to it should try to respect it."[2]

Concerning the buildings grouped at the street intersection, the Foundation notes:

> "The most important architectural feature of this important intersection is the buff color of the brick and terra cotta clad Mills, Russ and Alexander Buildings. The Mills and Russ Buildings are premier landmarks in the Financial District. It is especially important that the venerable Mills Building not be overwhelmed by an unsympathetic neighbor."[3]

The west side of Montgomery Street opposite the proposed building is dominated by low buildings with a variety of retail shops and services. The number and character of small retail-oriented enterprises that remain in the area and along Montgomery Street are important factors in keeping the area a pleasant, even colorful pedestrian area. The City Planning Department has recognized this and desires to maintain or expand such activities.

---

1. Bevis Hillier, Art Deco of the 1920s, 1968. "Art deco is an assertively modern style developing in the 1920s and reaching a high point in the 1930s; it drew inspiration from ... art nouveau, cubism, the Russian Ballet, American Indian art, and the Bauhaus ... it ran to symmetry ... and to the rectilinear."
2. Randolph Delehanty, The Foundation for San Francisco's Architectural Heritage, June 28, 1976.
3. Ibid.

Development guidelines prepared for the site by the City Planning Department state that "Ground level uses that generate pedestrian interest should be developed along Bush and Montgomery Streets. Retail shops and eating and drinking places would be desirable. Street level building frontage devoted to the building's lobby should be minimized."[1]

The block of Bush Street east of Montgomery is dominated by the long, solid masonry facade of the 22-story Standard Oil Building on the side of the street containing the proposed project site, and by the long 10 and 22 story terra cotta facade of the Mills Building on the opposite side of the street.

A bronze plaque mounted on the corner of the E.F. Hutton Building identifies the block containing the proposed site as the location of the first California State Fair, a California Historical Registered Landmark.

C. TOPOGRAPHY, GEOMORPHOLOGY, DRAINAGE, SEISMICITY

Prior to the filling of the San Francisco Bay in the early 1850s, the site and its surroundings were covered with wind deposited sand dunes. The upper portion of the dune sand was subsequently removed and used as fill material within the Bay to achieve the present shoreline.[2]

The site is now covered by the three existing buildings. All three buildings have single-level basements, some of which are extended in part underneath the existing sidewalks. Surface runoff drains into the San Francisco combined storm and sanitary sewer system.

---

1. San Francisco Department of City Planning, Guidelines for Development: Southeast Corner of Montgomery and Bush Streets, September 22, 1975, Revised October 30, 1975.

2. P.D. Trask, and J.W. Rolston, "Engineering Geology of San Francisco Bay, California," Geol. Soc. America Bulletin, V. No. 9, p. 1085, 1951.

Elevation is approximately 20 feet (San Francisco datum).[1] While test borings have not been taken at the site, the following subsurface conditions have been found for areas near the site:[2]

<u>Pine and Sansome</u>

15' to 20' Fill (Below Surface)
10' $\pm$ Bay Mud
Below 35' Sand and Clay
Water Table 12' $\pm$

<u>Montgomery-Sutter-Market</u>

2' Fill
30' Thick Sand
10' Thick Clay
40' Thick Sand
110' Bedrock Sandstone
Water Table 30'

<u>Sansome and Market</u>

20' Fill
10' Bay Mud
Sand and Clay Below Bay Mud

---

1. San Francisco datum is the point, line, or surface with reference to which elevation is measured by the Department of Public Works, City and County of San Francisco.

2. Letter from George E. Hervert, Vice President, Woodward-Clyde Associates, consulting engineers, geologists, and environmental scientists to Michael Hall, Gerald D. Hines Interests, December 2, 1975.

In common with the rest of San Francisco, the site is in an active seismic belt, classed by the State of California Department of Natural Resources as being in the zone of most severe potential earthquake damage.[1] The San Andreas and Hayward fault systems pass within about seven and twelve miles of the site, respectively.

The site is located in "an area of liquefaction potential".[2] According to Blume, "all areas where man-made fill rests upon soft bay mud or consolidated sand may be considered to possess a liquefaction hazard potential."[3] Blume also notes that the site is in an area of potential subsidence hazard.[4]

---

1. The California Division of Mines and Geology has divided the state into three zones based upon the maximum expected intensity of an earthquake occuring in the zones. San Francisco is located in the highest severity zone. The probable maximum intensity for an earthquake in this zone is IX or X as measured by the modified Mercalli Scale of 1931. The effects of an earthquake of intensity of IX or X are expected to be general panic by people, substantial ground disruption, and substantial damage to buildings and to the city's physical infrastructure. From: State of California, Division of Mines and Geology, Urban Geology Master Plan for California, Bulletin 198, Sacramento, California, 1973, pp. 20-21.

2. Liquefaction: Earthquake induced transformation of a stable granular material, such as soil, into a fluid-like state similar to quicksand.

3. John Blume and Associates, San Francisco Seismic Investigation, prepared for the San Francisco Department of City Planning, June 1974.

4. Subsidence: An uneven local settlement of the ground's surface. Although it can occur under static (normal) conditions, it is frequently activated by strong ground motion, such as that from a major earthquake.

The three buildings presently on the proposed site, including the E.F. Hutton Building, have been identified by the Department of Public Works[1] as having cornices and other facade elements that could fall during an earthquake, which consequently must be removed or secured in a structurally improved manner.

D. OTHER PROJECTS IN AREA

This project is one element of the long term growth in office related activities presently occurring in the finance and administrative district and broader downtown area. This is further discussed in the following section. Employment in the downtown area north of Market Street is projected to increase by 35,000-51,000 jobs in the years 1973-2000, representing from 45% to 32% of total new employment in the city (for respective low and high projections). Demand for new office space in the downtown area north of Market Street is projected to total about 4.7 million sq. ft. over the next 12-year period.[2]

A significant portion of this space has been developed since 1973. The San Francisco Department of City Planning reports that it knows of only two other large office building projects now committed within the projected area (defined by the city as a two-block radius of the site).

First California Bank Building (previously titled Bank of Tokyo)
Case EE 74.170, February 27, 1975
Located at California and Sansome
Under construction

---

1. Lew, Franklin, Structural Engineer, Chief Parapet Safety Section, Department of Public Works, City and County of San Francisco. Three letters dated 2 Feb. 1976, to City Savings and Loan Association (concerning lot 6C), Northern Counties Title Insurance Company (concerning lot 6B), and Northern Counties Title Insurance Company (concerning lot 6A).
2. San Francisco Department of City Planning, Commercial Trends: Report Containing Background Information for the Commerce and Industry Element of the Comprehensive Plan of San Francisco, July 1975.

23 stories
348,127 gross sq. ft.
294,441 net rentable sq. ft.
Approximately 1100 persons occupant

595 Market Street
Case EE 74.322
1975
Approved but not yet under construction, project uncertain at this time.
29 stores
427,693 gross sq. ft.
378,000 net rentable sq. ft.
Approximately 2665 persons occupant

Separate EIRs are available from the City Planning Department for each project.

Under construction outside the project area, but within the finance and administrative district is the Bechtel Building at 333 Market Street. Other large office buildings either now being completed or proposed for sites adjacent to the finance and administrative district include One Market Plaza (foot of Market), Embarcadero III (Davis and Clay), and 505 Sansome.

E. LAND USE AND OFFICE SPACE DEMAND

The proposed Montgomery-Bush site is in the center of the finance and administrative district. This district is the location of most major San Francisco firms in finance, insurance, real estate, business services, and administrative units. These are establishments whose activities require close contact with clients located in the district and/or enjoy considerable benefits from the agglomeration of similar activities of the district. Consequently, the land use in this district is characterized by high-density office use.

An average annual growth of approximately 800,000-1,000,000 gross sq. ft. has occurred in recent years for competitive office space, the great majority of this new space is constructed in the finance and administrative district.[1] The buildings constructed since 1960 average 26 stories and approximately 534,000 gross sq. ft. per building. Being larger and more spacious than older office stock, they reflect a new emphasis on increased personal space for efficiency and prestige, and more functional space for records storage and such supportive services as business machines and computer systems.[2]

The Department of City Planning, in a background report to the San Francisco Comprehensive Plan, stated that "... Barring any long-term economic downturn, future demand for new office space will be strong in San Francisco."[3] Recent vacancy surveys of downtown office buildings support this finding. A June 1976 article in the San Francisco Examiner[4] reported that the vacancy rate for office buildings constructed between 1964 and 1971 was less than 1%. Of the 15 buildings completed from 1972 to 1975, the rate was reported to be at 9%. The bulk of this vacant space was located in the partially completed One Market Plaza building located at the end of Market Street. For purposes of comparison it was reported that the vacancy rates in Los Angeles and New York are running at about 20%.

---

1. San Francisco Department of City Planning, Commercial Trends, op. cit.
2. Ibid.
3. Ibid.
4. Donald Canter, "Skyscraper Boom is Slowing Down," San Francisco Examiner, Business Page, June 9, 1976.

The strong demand for office space in the finance and administrative district[1] is due in part to national employment growth trends shifting steadily toward administrative activities, coupled with the fact that San Francisco is one of the few American cities in demand both as a national and regional center.[2] A recent survey[3] conducted for the applicant by Grubb and Ellis found a negligible vacancy rate of about 1% along the Montgomery Street corridor, the corridor in which the applicant proposes to construct the building.

Grubb and Ellis reports that there was in 1975 an anticipated demand of 5,000,000 net sq. ft. or a 23% increase over existing space through 1978.[4]

At present there are two other office space projects[5] committed in the district. Together these projects will supply 625,000 net sq. ft. of new office space. This combined with the estimated available 400,000 net sq. ft.[6] fails to satisfy the estimated demand by approximately 3,750,000 net sq. ft. The inclusion of office space in buildings proposed for areas adjacent to

---

1. San Francisco Department of City Planning, Commercial Trends, op. cit.
2. Ibid.
3. Bill McCubbin (Grubb & Ellis Commercial Brokerage Company), Recent Trends in High Rise Office Space Construction and Absorption, San Francisco Financial District (undated copy).
4. Ibid.
5. California First Bank - Sansome and California streets - 274,000 net sq ft; 595 Market Street - 378,000 net sq ft.
6. Bill McCubbin, op. cit.

the district[1] increases the projected supply to a maximum of 2.708 million net sq. ft., an amount still failing to meet the existing demand by approximately 2.29 million net sq. ft.

F. TRANSPORTATION AND CIRCULATION

1. Transit Service

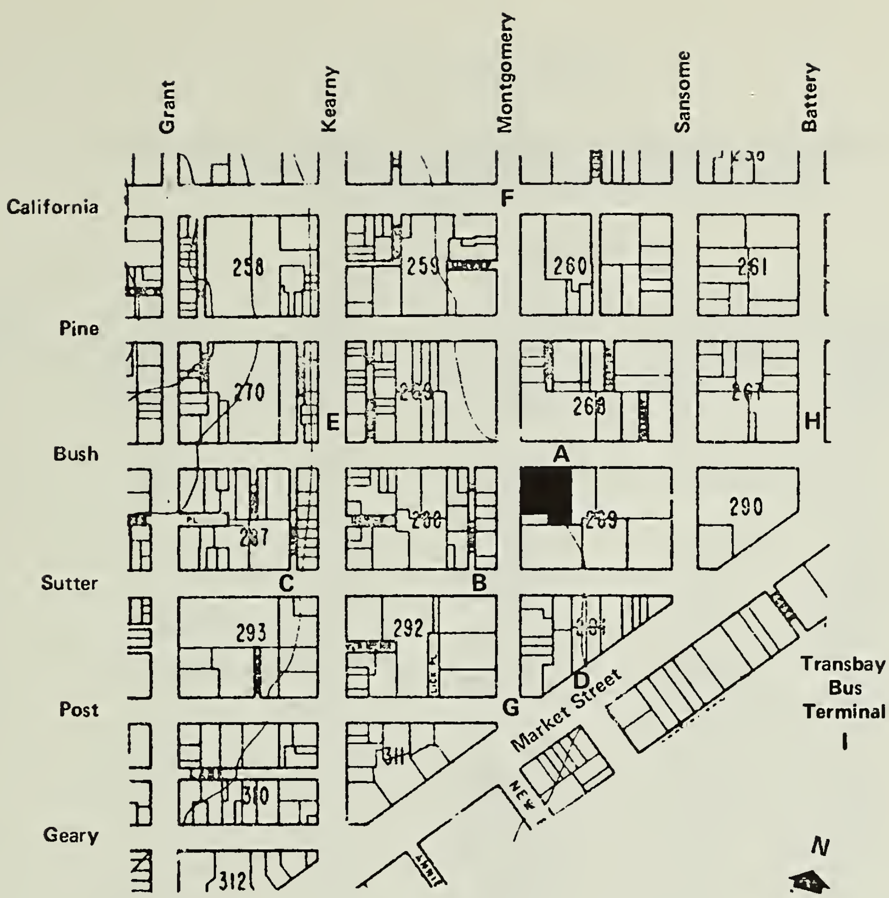
The finance and administrative district, containing the proposed site, is the centroid of much of the transit service of the city and has the greatest variety and level of transit service in the city. Access to transit services near the proposed site is shown in Figure 13. Each category of transit is described below.

- San Francisco Municipal Railway (Muni). Within two blocks of the site are 20 Muni lines, providing access throughout the city. These are shown on Figure 13. Ridership is shown on Tables 3A and 3B. Muni is presently operating routes and vehicles to the full capacity of its budget. The Muni does not anticipate any increase in its budget which would allow it to increase the capacities of its motor coach, trolley, and cable car lines. Therefore, any increase in the capacity of one of these lines would result through a proportional decrease in the capacity of another line.

1.

Name of Building	Location	Amount Available
One Market Plaza	Foot of Market	700,000 net sq.ft. as of 6/76
Bonel No. 2	Howard and Main	220,000 net sq.ft.*
Embarcadero III	Davis and Clay	600,000 net sq.ft.*
505 Sansome Street	505 Sansome Street	163,000 net sq.ft.*
		1,683,000

*Assumes 100% vacancy.
Source: Grubb & Ellis Commercial Brokerage Company.



Key:

A	Bus Stop for Inbound Muni Lines 1, 2, 3, 4, 42, 45, and Southbound Line 15
B	Bus Stop for Outbound Muni Lines 1, 2, 3, 45
C	Bus Stop for Northbound Muni Line 30 (southbound runs on Stockton)
D	Bus Stop for Inbound and Outbound Muni Lines 5, 6, 7, 8, 21, 31, J, K, L, M, N
E	Bus Stop for Northbound Muni Line 15
F	Stop for California Street Cable Car
G	Montgomery Street BART Station Entrance
H	Bus Stop for Outbound Golden Gate Transit Buses to Marin and Sonoma Counties (nearest inbound stop is at Sacramento and Sansome)
I	AC Transit and Greyhound Service to the East Bay

FIGURE 13 TRANSIT SERVICES IN VICINITY OF PROPOSED BUILDING

TABLE 3A

PATRONAGE/CAPACITY PROFILES FOR MUNI LINES
SERVING THE SITE OF PROPOSED PROJECT

A.M. PEAK HOUR 7:30-8:30

Line	Schedule Vehicles	Average Seats	Schedule Seats	Schedule Capacity*	Observed/Observed Load**/Capacity	% Utilization of Observed Capacity
1-3	19	50	950	1425	805/1275	63
2,2x	34	48	1632	2448	1740/1728	100
5	15	50	750	1125	793/750	101
6	14	48	672	1008	605/936	65
7	8	48	384	576	285/504	57
8	18	48	864	1296	809/936	86
15	34	48	1536	2448	1126/1440	78
21	12	50	600	900	501/750	67
30	16	50	800	1200	1135/1200	95
30x	16	46	736	1104	714/966	74
31	15	48	720	1080	1253/1080	120
45	12	48	576	864	794/864	92
61	10	32	320	720	500/720	69
85			OPERATES DURING OFF-PEAK HOURS ONLY			
J	17	54.4	925	1665	827/1272	65
K	12	54.4	653	1175	707/588	120
L	19	54.4	1034	1861	699/882	79
M	8	54.4	435	783	536/686	78
N	21	54.4	1142	2056	1280/1469	87

*Capacity - Capacity is defined by the Muni as 150% of the number of seats for coaches and trolleys, 180% for street cars and 225% of the number of seats for cable cars. Capacity is not a measure of the maximum number of individuals who could ride on a vehicle at one time, but is the level of service which Muni has defined as acceptable.

**Load - Load is the number of persons riding on a line during a specified period.

Source: San Francisco Public Utilities Commission, James Finn, Director of Transportation.

TABLE 3B

PATRONAGE/CAPACITY PROFILES FOR MUNI LINES
SERVING THE SITE OF PROPOSED PROJECT

P.M PEAK HOUR 4:30-5:30

Line	Schedule Vehicles	Average Seats	Schedule Seats	Schedule Capacity*	Observed/Observed Load**/Capacity	% Utilization of Observed Capacity
1-3	20	50	1000	1500	1220/1500	81
2,2x	26	48	1248	1872	1232/1224	100
5	18	50	900	1350	824/825	100
6	14	48	672	1008	785/1008	78
7	8	48	384	576	328/526	57
8	17	48	816	1224	928/1152	81
15	33	48	1584	2376	1141/1296	88
21	13	50	650	975	580/825	70
30	19	50	950	1425	1072/1200	89
30x	10	46	460	690	576/621	93
31	16	48	768	1152	892/792	110
45	11	48	528	792	679/792	86
61	11	32	352	792	650/720	90
OPERATES DURING OFF-PEAK HOURS ONLY						
J	12	54.4	653	1175	710/1076	65
K	13	54.4	707	1273	519/587	88
L	16	54.4	871	1568	717/783	92
M	10	54.4	544	979	815/882	92
N	18	54.4	980	1764	1166/1273	92

*Capacity - Capacity is defined by the Muni as 150% of the number of seats for coaches and trolleys, 180% for street cars and 225% of the number of seats for cable cars. Capacity is not a measure of the maximum number of individuals who could ride on a vehicle at one time, but is the level of service which Muni has defined as acceptable.

**Load - Load is the number of persons riding on a line during a specified period.

Source: San Francisco Public Utilities Commission, James Finn, Director of Transportation.

• Bay Area Rapid Transit (BART). The proposed project is located two blocks from the Montgomery Street BART station (see Figure 13). Hours of service are currently from 6:00 a.m. to approximately 1:00 a.m. on weekdays; no weekend service is normally provided. BART states that demand currently exceeds capacity on trains serving this station during the evening peak from 4:30 p.m. to 6:00 p.m. Capacity will not be increased until the California State Public Utilities Commission gives approval. This approval will be based on the solution of a number of problems, which cannot be adequately assessed here. Over the next five years BART expects to increase its daily capacity to 200,000 person-trips per day. It projects that in five years daily demand will be between 170,000 and 180,000 person-trips per day; it presently operates at a level of 130,000 person-trips per day.[1]

• Golden Gate Transit. The Golden Gate Transit District provides commuter bus service between Marin County and the finance and administrative district during peak hours, operating on Battery Street inbound (arriving 6:46-9:50 a.m.) and Sansome Street outbound (departing 3:30-6:15 p.m.). The inbound bus stop is two blocks from the project site; the outbound bus stop is four blocks from the site (see Figure 13). The District states that capacity is presently sufficient for demand.[2] Service other than during commute hours is available on the Civic Center route, with the closest stop at the Transbay Terminal, three "long" blocks from the proposed project site.

• Alameda-Contra Costa Transit District. Bus service to and from Alameda and Contra Costa counties is provided by the AC Transit District at the Transbay Terminal, three "long" blocks from the proposed project site (see

1. Conversation with Bill Hein, Director of Planning, BART, December 22, 1976.
2. Conversation with Jerome M. Kuykendall, Assistant to General Manager for Planning and Research, Golden Gate Bridge, Highway and Transportation District.

Figure 13. The District states that capacity is presently in balance with demand, and that additional service could be provided with existing equipment.[1]

- Greyhound. Greyhound provides commuter service to and from the Peninsula and northern Contra Costa County at the Transbay Terminal and the 7th and Market streets terminal.

- Southern Pacific. Train commuter service to and from the Peninsula is provided at the Southern Pacific Depot, 4th and Townsend streets, approximately 11 blocks from the proposed project. Connecting transit service is provided by Muni.

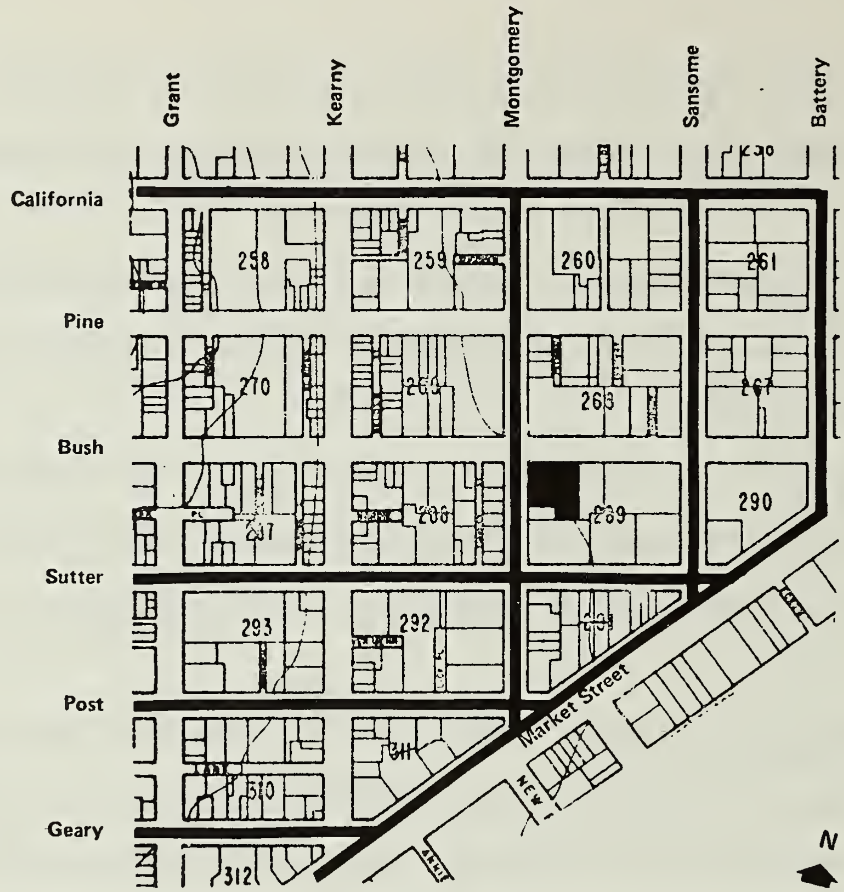
- Transit Preferential Streets. Those streets in the area of the project designated as "transit preferential streets" by the Transportation Element of the San Francisco Master Plan are shown on Figure 14. Priority is given to mass transit on these streets by measures such as exclusive lanes, timing of traffic lights, restriction of auto turning movements, etc.

2. Vehicle Access

- Major and Secondary Thoroughfares. Figure 15 shows those streets designated by the San Francisco Master Plan's Transportation Element[2] as major thoroughfares, defined as cross-town thoroughfares whose primary function is to link districts within the city and to distribute traffic from and to the freeways. There are no designated secondary thoroughfares, defined as intra district serving as collectors for major thoroughfares, within the project area.

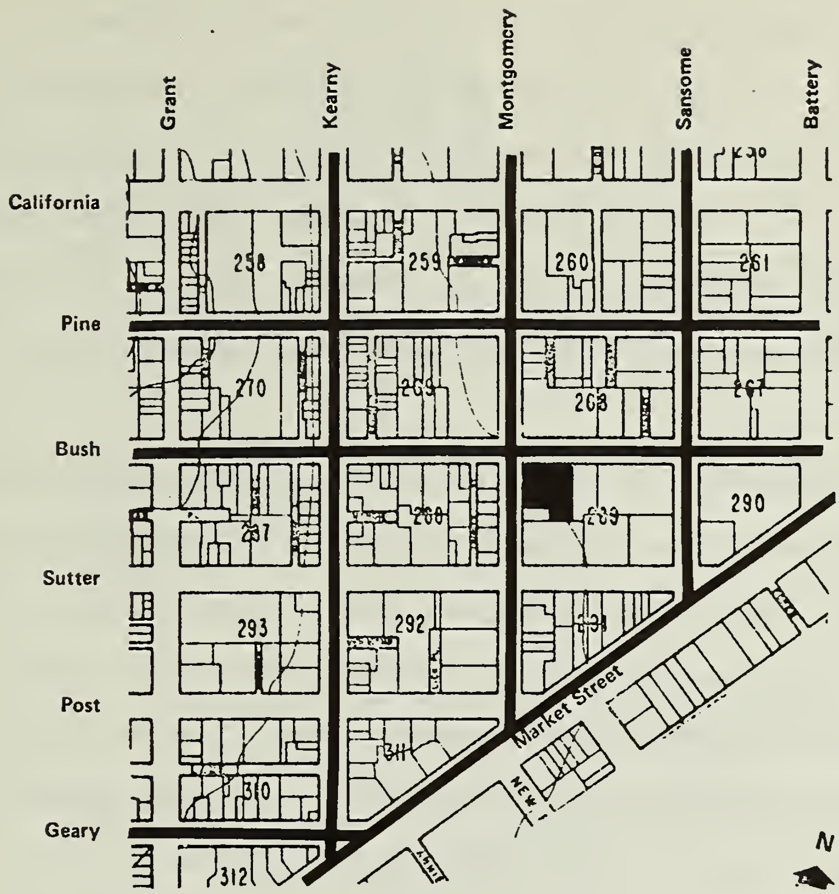
---

1. Conversation with Don Larsen, Senior Planner, AC Transit.
2. Adopted by Resolution 6834 of the San Francisco City Planning Commission on April 27, 1972.



Source: San Francisco Master Plan, Transportation Element.

FIGURE 14 DESIGNATED TRANSIT PREFERENTIAL STREETS



Source: San Francisco Master Plan, Transportation Element.

FIGURE 15 DESIGNATED MAJOR THOROUGHFARES

Street System. Characteristics of the street network adjacent to the project are shown in Figures 16 and 2 (on page 49 and 7 respectively). Counts of existing traffic at the Bush-Montgomery intersection were taken by Arthur D. Little, Inc., (ADL) as Department of Public Works counts were not available, and have been given in Table 4. Freeway access to and from the San Mateo Peninsula and the East Bay is nearby (see Figure 2, page 7).

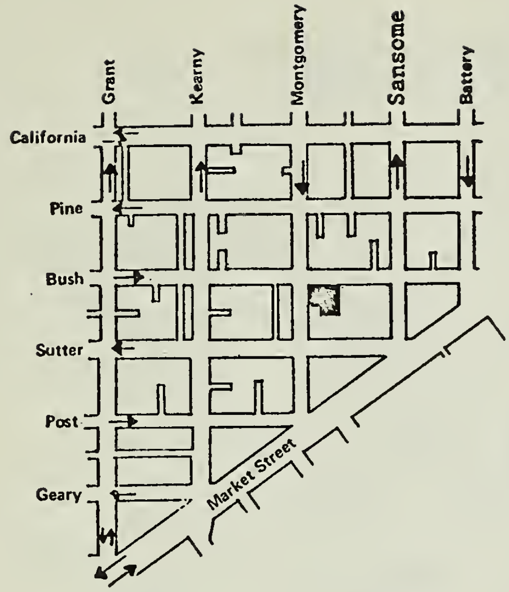
3. Parking

There are approximately 4140 off-street parking spaces in commercially operated garages and lots within roughly two blocks of the proposed project. Conversations by the firm of Arthur D. Little, Inc., with operators of these facilities indicate that daily occupancy is typically about 80%. Within a two block radius of the site there are 168 meters, all limited to 30 minutes. One hundred and seven of these meters are in Special Truck Loading Zones, usually limiting availability to service vehicles before 1:00 p.m. on weekdays.

The location of commercial garages and lots providing off-street parking is given in Figure 17. The location of on-street parking, including the locations of truck loading zones, special truck loading zones, and passenger loading zones is provided in Table 14 of Appendix D, page 131, and tow-away restrictions are defined in Figure 21 of Appendix D, page 134.

4. Bicycle Access

Market, Sansome, and Battery have been designated as bicycle routes in the Transportation Element of the San Francisco Master Plan. Although these streets are designated as streets which should be improved as bicycle routes (see Figure 22 in Appendix D, page 135), there is no immediate plan to do so.



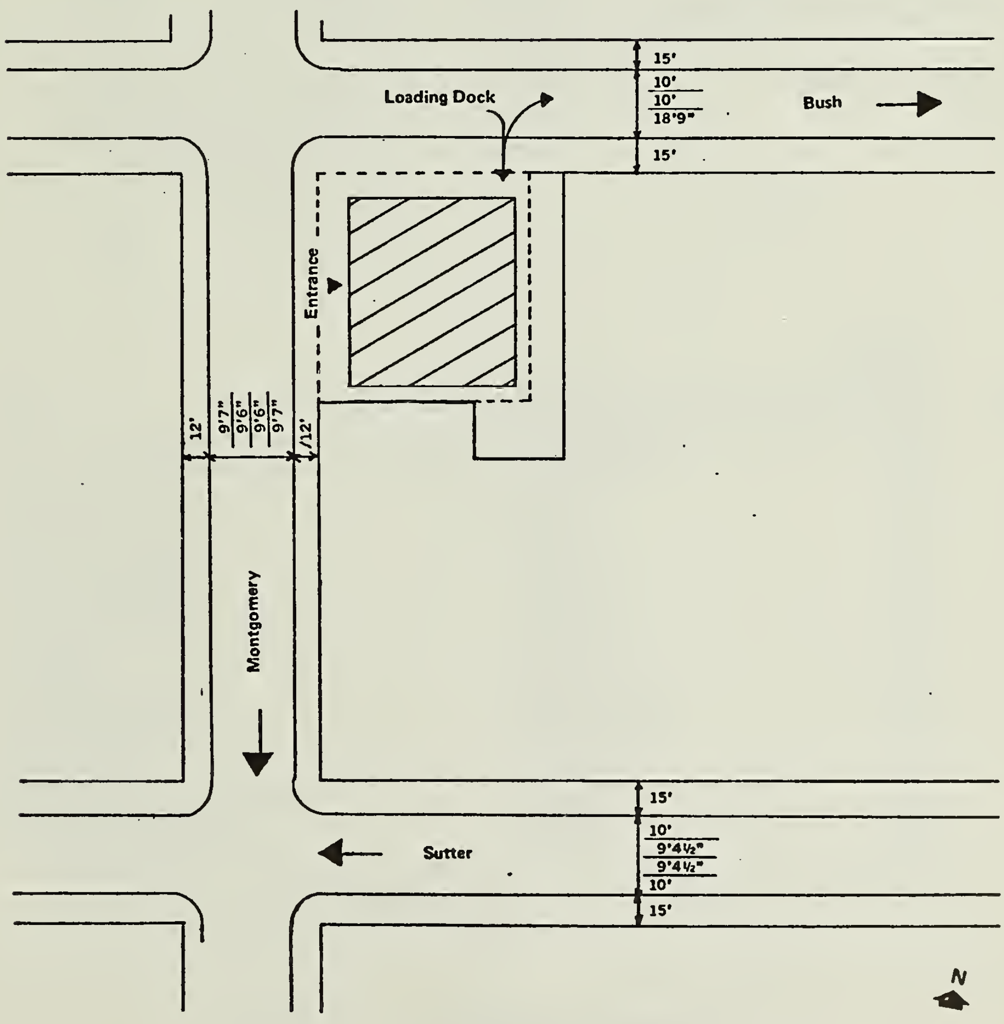


FIGURE 16 EXISTING STREET NETWORK

TABLE 4

TRAFFIC COUNTS FOR MONTGOMERY STREET AND BUSH STREET 4:30 P.M. to 5:30 P.M.

Southbound on Montgomery	Number of Vehicles
Left Turn to Bush	185
Straight on Montgomery	799
Total	984
Eastbound on Bush	
Right Turn to Montgomery	347
Straight on Bush	862
Total	1,209

Source: Count conducted by Arthur D. Little, Inc., on Wednesday, June 30, 1976.

Garage	Address	Off-street Parking Spaces
320 California Garage	320 California	55
Plaza Parkade Garage (Bank of America headquarters)	555 California	415
Exchange Center Garage	235 Pine	195
Private Garage	515 Pine	N.A.
Mills Building Garage	220 Bush	140
Financial Center Garage	345 Bush	450
Sutter Hotel Garage	191 Sutter	65
White House Parkade	223 Sutter	350
Lick Garage	55 Lick Place	525
St. Mary's Square Garage	433 Kearny	980
Russ Building Garage	235 Montgomery	300
222 Sansome Street Garage	222 Sansome	110
Private Garage	160 Sansome	16
R. Stanley Dollar Building Garage	135 Battery	185
Commercial Center Garage	36 Battery	220
Shell Building Garage	35 Battery	136
Approximate Number of Off-street Parking Spaces		4,142

FIGURE 17 OFF-STREET PARKING

G. AIR QUALITY

Carbon monoxide is the most commonly emitted air pollutant in urban areas, comprising roughly three-quarters of automobile emissions. Localized concentrations are of concern for this pollutant. Three factors are important in estimating the concentrations reached in particular areas: the characteristics of vehicular sources, the emissions rate of individual vehicles, and the meteorologic process that results in dispersion of emissions.

The San Francisco Department of Public Works has only limited data available concerning vehicular trip loadings on streets within the finance and administrative district. The focus of their efforts is on "cordon counts," the count of the number of vehicles entering or leaving particular areas of the city as they pass through the perimeter of that area. Counts are occasionally made within the district, however, and data were available to permit an analysis of carbon monoxide concentrations at intersections of Bush and Montgomery (the proposed project site), and at the Pine and Sansome intersection and California and Sansome intersection (both heavily traveled and near the proposed project).

Vehicular emissions rates are a complex function of the internal combustion technology of various model years combined with deterioration and modified by differences in the operating characteristics of the engine under varying speeds, loads, and temperature. The U.S. Environmental Protection Agency (EPA) approach has varied in recent years, and currently stresses the empirical nature of auto emissions based on the actual driving cycle observed. Data in the most recent supplement to the publication

AP-42[1] focuses on empirical measurement and emphasizes the errors of projection, presenting empirical data for calendar years 1972 and earlier. In some instances, the carbon monoxide empirical emissions level data for low route speeds is 4 times greater than earlier projected emissions for the same year. Analysis for this study was therefore made on the basis of both EPA 1972 rates and Bay Area Air Pollution Control District (BAAPCD) projected rates.[2]

The meteorology of pollutant dispersion in cities is complex and little understood by comparison with analysis suitable for vehicular sources in relatively open country. The most obvious urban component -- large buildings and canyon-like streets -- complicate the airflow patterns, wind speed, and mixing characteristics. Both "typical" and "worst" case meteorologic conditions were hypothesized for this analysis.

These factors are further elaborated upon in Appendix E , where the process is described by which estimates were made of carbon monoxide concentrations at the identified three intersections.

---

1. U.S. Environmental Protection Agency, Office of Air and Waste Management/ Office of Air Quality Planning and Standards, Supplement No. 5 for Compilation of Air Pollutant Emission Factors, Second Edition, Supplement to AP-42, December 1975.
2. Bay Area Air Pollution Control District, Guidelines for Air Quality Impact Analysis of Projects, June 1975.

Those calculations indicate that if emmissions levels for individual vehicles follow the empirical data recently presented by the EPA, several street segments now produce levels of carbon monoxide concentration in excess of state and federal one-hour standards when winds are parallel to the street segment during worst case air stability conditions. Conversely, consideration of emissions projections based on 1980 technological improvements and defined by BAAPCD result in lower carbon monoxide levels and no violation of the ambient air quality standards for this pollutant.

The complexity of the urban situation combined with the necessarily elaborate algebraic combination of rather variable parameters leads to a substantial degree of variation in the estimates of carbon monoxide experience. Actual carbon monoxide levels under most circumstances are expected to be lower due to the greater role of turbulence induced by surface roughness than has been taken into account in the model used. There are, however, meteorologic conditions which closely mimic the worst case such that it does represent a realistic albeit conservative estimate of pollutant conditions that may be experienced on the order of several days per year.

The large numbers of pedestrians on the streets of the finance and administrative district during peak traffic hours are the principal receptors exposed to these concentrations.

Where local air quality is most affected by carbon monoxide concentration, regional air quality is most affected by hydrocarbons and nitrogen oxides, essential ingredients in the formation of oxidants and photochemical smog. As oxidants are normally formed hours and miles away from the source of emissions, impacts must be assessed on a regional basis rather than localized to San Francisco. The Bay Area's primary source for

these oxidants is motor vehicles. The federal one-hour photochemical oxidants standard of 160 micrograms per cubic meter (160 ug/m^3 or 0.08 ppm) not to be exceeded more than once per year, has superceded the older California one-hour standard of 200 micrograms per cubic meter (200 ug/m^3 or 0.10 ppm). The federal standard was in fact reported exceeded on 60 days in 1974 at San Francisco Air Basin monitoring stations. In San Francisco specifically, the federal standard was reported exceeded twice in 1973 with a maximim concentration of 0.12 ppm, four times in 1974 with a maximum of 0.14 ppm, and was not exceeded in 1975.[1]

H. CLIMATE

Temperatures in San Francisco are moderate owing to the influence of marine air. Temperatures are highest in fall and lowest in winter; both spring and summer are normally cool, with a frequency of low clouds and fog. Wind in San Francisco is strongest in late spring and throughout the summer months, and lightest in winter.

The construction of many high-rise office buildings in the finance and administrative district has resulted in increased wind force and shadow at street level in that area, and wind tunnel tests are now required of any proposed building to provide information to city staff of the building's affect on its microclimate.

I. BIOTA

There are street trees on the sidewalk adjacent to the Montgomery Street side of the site. Typical urban birds, rodents, and insects represent the non-human biota on or near the site, in addition to typical urban micro-organisms.

---

1. This data corresponds to that issued by the BAAPCO and the Air Resources Board, in that it is not adjusted for measurement error identified in 1975. Actual maximum concentrations are estimated at 80% of given figure.

IV. ENVIRONMENTAL IMPACT

If the building were to be occupied with tenants having a density of less than one person per 150 net square feet, the population-related impacts (transportation, water, sewage, etc.) would tend to be proportionately reduced (e.g., related impacts of 1360 occupants as estimated by the developer would tend to be 58% of those of the 2360 occupants used in the calculations below).

A. SEISMIC HAZARD

The site is in an active seismic area with a potential for liquefaction subsidence. Unless soils investigations and building design were conducted in accordance with the procedures and requirements determined by the City Building Codes and the Community Safety Element of the Comprehensive Plan of San Francisco, risk of potentially dangerous damage to the building and harm to its occupants would be increased. The developer and his design consultants will conform or surpass these city requirements.

However, even if the building is designed to minimize the consequences of an earthquake, the building may be affected by an earthquake in such a manner that there would be falling objects, glass, etc., within the building and particularly from the building which could seriously harm persons and property near it.

B. HISTORICAL, CULTURAL, ARCHAEOLOGICAL, ARCHITECTURAL AND SCENIC ASPECTS

The E. F. Hutton Building is a low-rise neoclassic structure of an earlier cultural and architectural design period that contributes to the visual appearance and familiarity of the finance and administrative district. It, and

the two adjoining neo-Georgian and contemporary style buildings would be demolished by the proposed project and replaced by a single contemporary design high-rise building.

The finance and administrative district is today increasingly dominated by high-rise office towers of a design idiom that is both "new" and of much larger urban scale. The result to the people of the area is a loss of "familiar" buildings, the loss of buildings that reflect ingrained cultural images, the loss of buildings that have much small scale architectural detail work. The frequent public criticism is that the new buildings are not "warm" or "human." This is of course to some extent a matter of design and can be mitigated in new buildings. In addition, the growth of office towers tends to decrease the amount of retail activity at street level, particularly of small shops, that adds much to the color and interest that is found enjoyable in San Francisco streets.

The proposed project would provide approximately 3860 net sq. ft. of new retail space at street level, where 2000 net sq. ft. had existed before, with at least part of this in shop functions that did not exist here at all before.[1] It would also widen the sidewalk area, and provide a small public plaza beside the building. The success of this and the extent to which the building as a whole is responsive to psychological aspects of human reaction will depend largely on design decisions yet to be made. The project design at the time of this writing has been defined in only broad terms.

---

1. Retail banking may occup the larger room (approx. 3000 net sq. ft.) of the proposed building ground floor, leaving the remainder for retail shops. The ground floor (2000 net sq. ft.) of the Gibraltar Building housed the Gibraltar Savings and Loan retail banking activity prior to sale and relocation.

Visually, the new building would replace a small cluster of low buildings on a corner dominated by surrounding high buildings (see Figures 9, 11, and 12 on pages 24, 27, and 29). The new building would therefore conform to its neighbors and the street, but reduce the variety of heights. It would be approximately 90 ft. lower in height (or 126 ft., if only 25 office floors are built) than that permitted by San Francisco zoning, and thus does not optimally reinforce the visual aspect of a "hill" of office buildings envisioned by the Urban Design Plan. However, the existing buildings in the blocks surrounding the proposed site are also substantially below the height limit. The proposed building at 29 stories and 410 ft. height would be taller than any other building at the corner of Montgomery and Bush streets, 102 ft. higher than the Standard Oil Building adjacent on Bush street, 90 ft. higher than the Equitable Life Building on Montgomery, and approximately the same height as the Russ Building on the northwest corner of the intersection. Height of existing buildings in the area of the proposed project are shown in Figure 9 on page 24, and photographs of the adjacent buildings are shown in Figures 11 and 12 on pages 27 and 29.

The developer and architect of the proposed project state that the proposed building's facade would be light in color, in conformance with city guidelines. Approximately 50% of the facade would be bronze glass, and the remainder would be opaque wall. The project is subject to discretionary review if deemed desirable by the City Planning Commission.

A plaza area, open to the public, would be provided by the developer on the east side of the site. Approximately one-third of the plaza area is in an arcade under the office tower. Access would be from both Bush Street (approximately 35-ft. frontage) and Montgomery Street (by an 80-ft. long

walkway, approximately 6 ft. wide); the plaza could extend approximately 195 ft. to the rear of the site. Its use would be constrained by both configuration and exposure to wind and shadow (see Microclimate); the plaza would not receive sun at any time. No open plaza space now exists in the area of the proposed project. This space is shown in Figure 3 on page 8. Detailed design of the proposed plaza has not been undertaken at this time.

During the summer of 1976 the proposed demolition of the three buildings was called to the attention of the Landmarks Preservation Advisory Board. At that time, one board member noted that a State Historical Landmark plaque is attached to the E.F. Hutton Building identifying the site as the location of the first California State Fair. It was requested that it should be preserved and mounted in a prominent location on the proposed building.[1]

No historical or archaeological findings are anticipated beneath the site, because of extensive historical cut and fill operations during development of this area of the city, removing pre-existing sand dunes, and establishing the existing sub-soil condition. The site does lie in the "yellow zone" of the San Francisco Archaeological Sensitivity Map, defined by the Department of City Planning as a zone having less than a "high" potential for significant archaeological finds, but still having a high possibility of containing material of archaeological interest.

C. LAND USE

The proposed project would reinforce the financial and administrative activity patterns of land use in the project area and would provide 288,000

---

1. Ed Michael, Secretary of the Landmarks Preservation Advisory Board, conversation of December 22, 1976.

additional net square feet to meet an anticipated demand of 5,000,000 net sq. ft. for the finance and administrative district through 1978. The building represents one increment in the pattern of new office construction discussed under Land Use in the preceding chapter.

Tenants for the proposed building would come from new businesses moving to San Francisco because of its position as a national and regional center, upwardly mobile existing San Francisco establishments seeking more prestigious space, and existing San Francisco establishments which are seeking increased proximity to clients or other institutions in the finance and administrative district but who may previously have been unable to obtain sufficent space due to the district's low vacancy rate.

The existing San Francisco establishments, by their move to new space, would tend to release older, less expensive space to other tenants. If this older space is located in or adjacent to the finance and administrative district, it would probably be readily rentable. Grubb and Ellis in a report[1] to the applicant noted that the demand for office space in the finance and administrative district is so strong that it causes the renovation and renting of existing older space. In a June, 1976 San Francisco Examiner article,[2] Elmer Johnson, Vice President of the Building Owners and Managers Association was reported as noting that most older buildings "were feeling no pain" with regard to vacancies. Older space in less central locations would not be as readily rentable as that near the finance and administrative district.

The only retail function on the site when purchased for this project was the 2000 sq ft Gibraltar Savings and Loan branch office serving

---

1. Bill McCubbin, op. cit.
2. Donald Canter, op. cit.

customers (a stationery store now occupies the space on a temporary basis). The proposed project would provide approximately 4120 net sq. ft. of retail space in two separate units on the street level. The larger unit, of 3000 sq. ft., may be occupied by a retail banking activity, but at minimum the 1120 sq. ft. unit, and possibly both spaces, would add new materials-sales retail activities on a site where previously there was none, and expand total retail area by 2120 net sq. ft. City Planning Department guidelines for development of the site emphasize ground level uses that generate pedestrian interest. This project would do that, but the department would strongly prefer to have shop or eating/drinking activities rather than a retail bank activity.[1]

D. ECONOMIC

1. Permanent Employment

Total employment in the new building would be between the developer's estimate of 1360 persons and a conservatively high estimate of 2360 persons, depending upon the ratio of professional to support personnel of the actual tenants (see discussion p. 16). If the building were to be occupied by only professional firms, such as lawyers and accountants, its population would be lower than if it were occupied by both professional firms and general business firms. The developer expects the building to be occupied principally by professional firms doing business in the finance and administrative district.

---

1. Conversation with David Lynch, San Francisco Department of City Planning, December 2, 1976.

The buildings currently on the site, if fully occupied, could house a population of approximately 410 persons. On December 31, 1976, most of the existing floor space was vacant, with only the Title Insurance Building being partially occupied by a dress shop and the Gibraltar Building partially occupied by a stationery/art supply store. The two stores reported their total employment at that date to be 10 employees.

Approval of the proposed building would result in a net increase of between 1350 and 2350 over the existing number of employees on the site and a 950-1950 increase over the number of employees on the site if the existing buildings were fully occupied.

The San Francisco Planning and Urban Renewal Association High-Rise Study[1] surveyed the demographic characteristics of a sample of downtown office buildings (1022 office workers surveyed in 1974) and reported an occupational and income distribution as seen in Table 5.

The developer's expectations and present tentative lease commitments suggest that employment in the proposed project will lead to a larger percentage of professional and higher income persons than the SPUR survey distribution.

The jobs represented in the proposed project are closely related to the ongoing expansion of downtown office-oriented employment discussed in preceding sections. Although many of the specific jobs located in the proposed building would not be new jobs with new employees (it is anticipated that most of the firms would relocate from other office buildings in the area), the net effect for the area and city would be an increase of jobs and employees.

---

1. San Francisco Planning and Urban Renewal Association, Detailed Findings, Impact of Intensive, High-Rise Development in San Francisco, Final Report, June 1975.

If the demand for office space is sufficiently high that little or no change would result in office space utilization elsewhere, as indicated in the preceding Land Use Impacts section, the proposed project would result in a net increase of 950-1950 jobs to the area (equivalent to the net increase of jobs the proposed building would house on-site in comparison to the existing buildings).

TABLE 5

DEMOGRAPHIC CHARACTERISTICS OF DOWNTOWN OFFICE BUILDING WORKERS

Occupational Distribution	
Clerical	44%
Professional and Technical	30
Managers and Proprietors	19
Sales	5
Other/Not Reported	2
Total	100%
Individual Income Distribution (i.e., salaries and wages)	
Under $8,000	18%
$ 8,000 - $ 9,999	16
10,000 - 14,999	22
15,000 - 19,999	19
20,000 - 24,999	10
25,000 - 49,999	10
50,000 or Over	2
Not Reported	3
Total	100%

2. Construction Employment

Estimates provided by the architects, based on past experience with similar buildings, the proposed building would require 216 person-years of on-site labor. That is, construction of the building would provide the equivalent of 216 full-time construction jobs of one year duration. The

architects expect the total of wages and salaries for these jobs over the construction period would be about $6.7 million.

Based upon a survey by the Human Rights Commission of construction workers on city projects that found a maximum of 40%[1] of workers on construction occuring in San Francisco live in San Francisco, it is estimated that a maximum of $2.7 million would accrue directly to these city residents.

Other studies have indicated that San Francisco resident employees spend 80%[2,3] of their disposable income in the city. Their purchases become income to those who sell goods and services, and they in turn spend a portion of their income on purchases and so on. The resulting increase in the level of economic activity supports additional jobs for San Francisco residents. An additional $2.6 million would be added to the San Francisco economy by the expenditures of these resident construction workers.

Other studies indicate that non-resident workers spend approximately 10%[4,5] of their disposable income in the city. Their expenditures would add approximately $10.4 million to the city's economy.

In summary, the San Francisco economy would receive up to approximately $2.7 million or 86 person-years of construction employment, and approximately 77[6] person-years of non-construction employment as a result of this project.

---

1. Conversation with Stanley Lim, Contract Representative, San Francisco Human Rights Commission, December 14, 1976.
2. Arthur D. Little, Inc., Table 4, Footnote C, p. V-18, <u>op</u>. <u>cit</u>.
3. San Francisco Department of City Planning, <u>Final Environmental Impact Report, Bank of Tokyo of California Building</u>, EE74.170, February 1975.
4. Arthur D. Little, Inc., Table 4, Footnote C, p. V-18, <u>op</u>. <u>cit</u>.
5. <u>Final Environmental Impact Report, Bank of Tokyo of California Building</u>, <u>op</u>. <u>cit</u>.
6. Based on a multiplier of 0.9 other jobs for each construction job, as presented in <u>Final Environmental Impact Report, Bank of Tokyo California Building</u>, ibid.

It should be noted that this would tend to support existing jobs rather than stimulate new jobs. Non-resident construction workers would spend the majority of their salaries and wages in communities outside San Francisco. Therefore, the impact of their employment and expenditures would be felt strongest in those communities.

E. POPULATION

Based on the assumptions discussed above in the Permanent Employment section and unpublished data from the SPUR High-Rise Study, Table 6 shows the expected geographical and individual income distribution for the estimated 2360 persons who would be employed in the building.

TABLE 6

RESIDENTIAL AND INDIVIDUAL INCOME DISTRIBUTION
OF EMPLOYEES OF PROPOSED BUILDING

County	Salary or Wage Less than $15,000		Salary or Wage Greater than $15,000		Total	
San Francisco	708	30%	260	11%	968	41%
San Mateo-Santa Clara	189	8	212	9	401	17
East Bay	283	12	307	13	590	25
North Bay	165	7	236	10	401	17
Total	1,345	57%	1,015	43%	2,360	100%

Sources: Unpublished data - SPUR High-Rise Study, San Francisco Office Worker Survey, Keyser Marston Associates, 1975.

F. PUBLIC REVENUES

The existing land uses on Assessor's Block 289, lot 6A, 6B, and 6C have a total declared assessed valuation of land and improvements of

$930,000 as of March 1, 1976. This figure is broken down by land and improvements below:

TABLE 7

EXISTING ASSESSED VALUATION OF LAND AND IMPROVEMENTS ON SITE

Block 289	Land	Improvements	Total
Lot 6A - 275 Bush & 148 Montgomery	$350,000	$ 50,000	$400,000
Lot 6B - 160 Montgomery	227,150	97,850	325,000
Lot 6C - 140 Montgomery	97,850	107,150	205,000
Total	$675,000	$255,000	$930,000

Source: San Francisco Assessor's Office.

At the present San Francisco tax rate (July 1, 1977 - June 30, 1978) of $12.82 per $100 of assessed value, these parcels generate approximately $119,000 in property taxes based upon a total land and improvement assessed value of $926,000.

Using an estimated cost of construction of $17,500,000, the assessed value of the parcels at the time of completion of the proposed building would be approximately $5,050,000 excluding the value of office furniture, machines, etc., and assuming no increase in the value of the land. This is a net increase of $4,120,000 in assessed value and, at the 1977 tax rate, of $528,000 in property taxes.

G. TRANSPORTATION AND CIRCULATION

It is estimated the proposed building would generate approximately 2360 home-to-work round trips each weekday, based on an assumed maximum building population of 2360. The professional activities located within the building would generate additional trips by occupants and by visitors. As locational proximity is a primary reason for choosing office space within the finance and administrative district, it is assumed that most additional trips will be

local, and that the total of extended trips will be equivalent to the theoretical occupancy of the building (not all occupants would be present on any one day).

If the existing buildings on the site were fully occupied with office related uses, they would generate approximately 410 home-to-work round trips each work day. The net impact of the project would then be the generation of 1920 round trips each weekday. However, as the existing buildings are now largely unoccupied and current transportation system figures do not include their use, the gross proposed impact of 2360 round trips per day is used in the analyses below. The net impact, however, is 19% less when adjusted for theoretical occupancy of the structures now existing on the site.

If the developer's estimates of 1360 occupants is accurate, home-to-work round trips would be proportionally reduced to 58% of that based on 2360 occupants as calculated below. However, there would tend to be an increased proportion of professional personnel in the building, which would tend to increase the proportion of suburban residents and private automobile use.

1. Place of Residence and Modal Split

Using data from the San Francisco Planning Department and from the San Francisco Planning and Urban Renewal Association (SPUR) Survey of CBD office workers[1] it is possible to anticipate the mode of transportation San Francisco office workers use to get to their jobs, i.e., their "modal split." For the estimated 2360 employees which would be added to the Bush and Montgomery location, place of residence and modal split are presented in Table 8

1. The data used is unpublished, provided by Keyser Marston Associates. The findings of this study are contained in SPUR High-Rise Study, op. cit.

It has been assumed that the place of residence distribution of the employees of the proposed building would be the same as for present downtown office workers.

TABLE 8

PLACE OF RESIDENCE AND MODAL SPLIT OF EMPLOYEES ADDED BY PROPOSED PROJECT

Location	Number of Employees		Mode of Travel							
			Auto		Transit		Walk		Other	
	Number	%	Number	%	Number	%	Number	%	Number	%
San Francisco	968	41	281	29	552	57	116	12	19	2
San Mateo/ Santa Clara Co.	401	17	525	81	76	19	-	-	-	-
East Bay	590	25	342	58	248	42	-	-	-	-
Marin/Sonoma Co.	401	17	293	73	108	27	-	-	-	-
Total	2,360	100%	1,241	53%	984	42%	115	5%	19	1%

Sources: San Francisco Planning Department, Ed Green, Transportation Section; Unpublished data from SPUR High Rise Study; Keyser Marston Associates

Within roughly two blocks of the site, one office building is in the construction phase and another has received certification of its EIR but construction is uncertain. The partially completed building is on the northeast corner of California and Sansome. It will be 23 stories, contain 348,000 sq.ft., and be occupied by approximately 1100 persons. The building whose EIR has been certified is proposed for the southeast corner of Second and Market, it will have a gross floor area of 428,000 sq. ft. and will be occupied by an estimated 2665 persons. Table 9 gives the estimated transit/non-transit split for the future occupants of these buildings along with the split for the occupants of the proposed building.

TABLE 9

TRANSIT/NON-TRANSIT SPLIT OF PROPOSED BUILDING AND BUILDINGS PLANNED AND UNDER CONSTRUCTION WITHIN A TWO-BLOCK RADIUS OF BUSH AND MONTGOMERY STREETS

Modal Split	Proposed Project 180 Montgomery	California & Sansome	Second & Market	Total
Number of Employees Added to Site	2,360	770	1,083	4,183
Transit	984	438	587	1,996
Non-transit (Auto)	1,241	332	496	2,187

Sources: Final Environmental Report, Bank of Tokyo of California Building, op. cit.; Draft Environmental Impact Report, (EE74.322), 595 Market Street, San Francisco Department of City Planning, December 1975.

2. Impact on Ridership

The increase in transit ridership induced by the project[1] would be approximately 984 round trips per day. Most of these would be Muni trips, although some would be on AC Transit, BART, Southern Pacific, Greyhound, and Golden Gate Transit. Since the Southern Pacific and Greyhound depots are several blocks from the site, many users of the site would use Muni to reach the depots. Therefore, Muni ridership would be approximately 628 round trips per day. Approximately 552 trips would be by San Francisco residents and 76 trips would be by building occupants taking the Muni to the other transit depots (see Table 8).

---

1. Note that this is based on 100% of the 2360-person occupancy of the proposed building, as present occupancy of the existing building is negligible. However, if the existing buildings were fully occupied, the net increase in proposed population would be only 1920 persons, a decrease of 19%.

The 22 Muni lines listed on Tables 3A and 3B, pages 42 and 43, serve the site. The aggregated observed morning peak capacity of these lines is approximately 18,000 patrons and the aggregated observed afternoon peak capacity is approximately 17,000 patrons. In the morning these lines operate at approximately 84% of their aggregated observed capacity, and in the afternoon at approximately 87% of agrregated observed capacity. The 628 patrons which the project would add to these lines in the morning and the afternoon would result in approximately a 3.4% increase in the morning aggregated patronage and a 3.6% increase in the afternoon aggregated patronage.

While these increases in patronage would not case the aggregated observed capacities of these lines to be exceeded, schedule changes by Muni would be required to incarease the individual capacities of the lines serving the site to avoid overcrowding those lines by the impact of the proposed building with the other buildings under development near the site (see Table 9). If such schedule changes were not made, the combined impacts of those projects would cause the 2, 2x, 31 and K lines to further exceed their observed capacities in the morning peak, and in the afternoon peak would result in the 2, 2x, and 31 lines further exceeding capacity and 15, 30, 30x, 45, L, M, N lines beginning to exceed observed capacity.

By the time the project would be completed, Muni expects to increase the capacity of the station lines (J, K, L, M, N) by approximately 50% through the completion of the "Muni Metro."[1]

Work transit trips originating in the East Bay would have an impact upon BART and AC Transit. Due to the proximity of the Montgomery Street BART station (two blocks from the site), it is assumed that the majority

---

1. San Francisco Public Utilities Commission, James Finn, Director of Transportation.

of East Bay trips would be made by BART. Although afternoon peak hour service on BART presently exceeds seated capacity, BART expects additional equipment to be put on line and headways to be reduced during the next two years which should increase the seated capacity. (Contrary to its projections, BART slightly increased headways recently.) The additional 248 trips (even all 248 to BART) would not have a significant impact on the system.[1]

Golden Gate Transit states that in order for them to serve the 108 additional round trips which would be generated by the project the system would be required to purchase 2.6 new buses, which would have an annual operation cost of approximately $100,000. This is based upon their assumption for planning purposes that all of the new riders generated by the project would wish to ride on lines presently at operating capacity.[2]

Transit service to San Mateo and Santa Clara counties is provided by Greyhound, Southern Pacific, and to Daly City by BART. Greyhound and Southern Pacific are presently operating with excess capacity. BART trains serving Daly City from the Montgomery Street station now exceed seated capacity during the afternoon peak period. An increase of 76 persons would not have a significant impact on these systems.

3. Private Vehicles

Approximately 1241 of the persons who would occupy the proposed building would use private auto transportation to and from the site.

---

1. Conversation with Bill Hein, Director of Planning, BART, December 23, 1976.
2. Conversation with Jerome Kuykendall, Assistant to General Manager for Planning and Research, Golden Gate Bridge, Highway, and Transportation District, January 7, 1977.

Using the San Francisco factor of 1.3 persons per car,[1] the proposed building would generate approximately 955 new private auto round trips each day.

It is estimated that 85% or 812 of these trips would be made during peak periods and the remaining 143 or 15% of the trips would be made during non-peak periods. These percentages are based on the assumption that the proposed building would be occupied by professional firms which would provide some of their services outside their offices (e.g., lawyers - in court, accountants - at the location of an audit, others - "in the field," etc.) and that the working schedules of some employees would allow them to arrive or leave during non-peak periods.

Of the estimated 812 new trips by private auto during the peak periods, it is estimated that one-third would be made to or from parking garages/lots within the immediate vicinity of the Montgomery-Bush site, the remaining two-thirds would probably use parking facilities on the fringe of the downtown area.

Of the 271 vehicles which would be leasing parking garages/lots in the immediate vicinity of Bush and Montgomery during the afternoon peak, it is estimated that 25% or 68 of them would use Montgomery Street and 25% or 68 would use Bush Street.

These additional private vehicles would increase the afternoon peak traffic count on Montgomery Street of 984 (see Table 4) by approximately 6.8%, increasing its flow from approximately 66% of its

---

1. Factor from Ed Green, Transportation Planner, San Francisco Department of City Planning. Mr. Green comments this factor may be high for the project as the higher-income professionals for which this building is planned tend to have more single-occupant auto trips than the city average, but no specific data are available to make a more accurate estimate.

capacity[1] to approximately 70% of its theoretical capacity. The service level[2] would remain at level A. As defined by the Highway Capacity Manual[3] this level of service represents a condition where there are no vehicles waiting longer than one red light.

The afternoon peak count of 1209 (see Table 4) on Bush Street would be increased by approximately 5.5%. This increased flow would raise its percent of capacity from approximately 81% to approximately 86%. At this level drivers may occasionally have to wait for more than one red light to proceed through the intersection.

The remaining 541 private vehicles leaving during the afternoon peak would be dispersed among other routes leaving the central business district.

The two office buildings not yet completed near the site would not tend to significantly increase the number of vehicles using Bush and Montgomery streets because more direct means of egress are available to them.

---

1. Capacity is the maximum number of vehicles which a street approaching an intersection can accommodate. At capacity there may be long lines of vehicles waiting upstream from the intersection for a green light and it may take several green lights before one can get through the intersection. (Based on Highway Capacity Manual, see below.)
2. Service levels are an attempt to describe intersection traffic conditions in terms of driver satisfaction. The levels are based on the load factor of the intersection. The load factor is the ratio of the number of green lights which are completely utilized by traffic to the total number of green lights available to traffic for the same period. The greater the number of loaded green phases in a period of time, the higher the probability that a driver will have to wait more than one green light to proceed through the intersection, and the less freedom the driver of a vehicle will have to negotiate through traffic. The higher the load factor, the lower the level of service. The highest level of service is A, the lowest is F. (Based on Highway Capacity Manual, see below.)
3. National Academy of Sciences-National Research Council, Division of Engineering and Industrial Research, Highway Research Board, Highway Capacity Manual, Washington, D.C., 1965, Chapter 6, p. 129.

4. Parking

Sufficient capacity does not exist in off-street parking facilities near the site to absorb the 955 private automobiles which would be generated by the project, assuming a building population of 2360 persons. The survey of off-street parking facilities which was conducted for this report found that there is only enough space in the existing facilities to accommodate approximately 830 additional automobiles. The number of spaces which would be available at the completion of the proposed project would probably be less than 830 since some of the presently available spaces will have been taken by the private automobiles generated by the California First Bank Building presently under construction and the 595 Market Building if it is developed.

However, high parking costs and traffic congestion in this central area encourage many auto users to park on the periphery of the downtown area rather than here. We estimate that one-third would choose to park nearby, with the remaining two-thirds choosing to park on the fringe of the finance and administration district where parking rates would be lower. Capacity does exist in this central four-square-block area to accommodate one-third of the autos generated by all three buildings, and, in fact,users would probably tend to scatter to a larger area than even this.

Since much of the parking on the fringe of the finance and administration district is located on sites scheduled for future development, the number of spaces available for parking would diminish in the future. This would probably lead to an increase in parking rates, causing some individuals to reexamine their mode of transit to work, with it being probable that some would switch to public transit. Such a change would

be consistent with the objectives of the Transportation Element of the San Francisco Comprehensive Plan.[1]

5. Service Vehicles

The proposed building would generate 12 to 15 service vehicle trips each day. The number of these trips would vary, since their frequency would be dependent upon the individual characteristics of the building's tenants.

A truck loading area is planned on the Bush Street side of the proposed building. Vehicles exiting this service area would turn into the flow of one-way traffic east of the intersection of Bush and Montgomery streets and thus not impede turning movements or pedestrians at the intersection.

6. Pedestrian Access and Impact

The plan of the building provides for one pedestrian entrance to the office tower, to be located on Montgomery Street. (See Figure 3, page 8). Separate entrances are provided for the two retail areas.

Arthur D. Little conducted two pedestrian counts at the site; one during a Tuesday lunch peak period (12:00-1:00 p.m.) and one during a Tuesday afternoon peak period (3:30-4:30 p.m.). From these counts it was found that the higher period of pedestrian movement at the site was during the lunch peak period. Two thousand and nine persons were counted on Montgomery Street and 1452 were counted on Bush Street during this

---

1. City of San Francisco, Department of City Planning, Transportation Element of the San Francisco Comprehensive Plan, op. cit.

period. Since it is the period of greatest pedestrian flow and as such the period most sensitive to increases in flow, this pedestrian impact analysis will focus on the lunch peak period.

From 12:00 to 1:00 p.m., it is expected that approximately 2360 persons, an amount equal to 100% of the population of the building, would leave and return to the building by the Montgomery Street entrance (less than 100% of building tenants, but including some visitors).

The immediate impact of these trips to and from the building would be on the Montgomery Street sidewalk, directly in front of the building. Based upon the above-mentioned pedestrian count, the existing average flow at this location is 6.7 PFM.[1] During the counting process, peaks were observed where the flow ranged upwards to approximately 20 PFM. When combined with the 20-foot widening of the sidewalk proposed as part of this project, the addition of 4720 pedestrian-trips during the lunchtime peak period would result in an increase of 5.9 PFM in average flow volume of pedestrians directly in front of the building, resulting in a flow of 12.5 PFM. As in the existing case, peaks with higher flows would occur.

---

1. PFM - Pedestrians per foot width of walkway per minute. For a further explanation of PFM and for descriptions of level of service at different PFM's see: John J. Fruin, Pedestrian Planning and Design, Metropolitan Association of Urban Designers and Environmental Planners, Inc., 1971, Chapter 4.

Of the two sidewalks adjacent to the site, the east Montgomery Street sidewalk is the heavier traveled during the lunch peak period. It provides direct access to Market Street and other streets which lead to major transit lines, retail stores, and restaurants. Like the existing office workers in buildings near the site, occupants of the proposed building would be expected to use Montgomery Street during their lunchtime journeys.

The impact of the project on the existing Montgomery Street sidewalk south of the site was assessed using three different flow assumptions. As there are eight different sidewalk routes serving the building (i.e., one on each side of each of four streets leading from the intersection), a minimum of one-eighth or 12.5% of the building's pedestrians should use this particular sidewalk. The flow would probably be greater due to the activities accessed by the Montgomery Street route, perhaps twice or even three times greater. Increased flows on this sidewalk due to 12.5%, 25%, and 37.5% of the proposed building's pedestrians and the resulting PFM are shown in Table 10.

TABLE 10

ESTIMATED INCREASES IN THE EXISTING EAST SIDE OF MONTGOMERY STREET SIDEWALK SOUTH OF THE SITE PEDESTRIAN FLOW: IF PROJECT WERE BUILT (BASED ON 12:00 p.m.-1:00 p.m. AFTERNOON PEAK)

% of Proposed Building's Occupants Who Would Use Sidewalk	Number of Persons	Existing PFM	New PFM	Increase in PFM
Level 1 - 12.5%	590	6.7	8.6	1.9
Level 2 - 25.0%	1,180	6.7	10.5	3.8
Level 3 - 37.5%	1,770	6.7	12.5	5.8

Since the Bush Street sidewalk adjacent to the site is not as heavily traveled as the Montgomery Street sidewalk (fewer retail activities lie in this direction), it is assumed that a maximum of 12.5% of the building's occupants would use this sidewalk during the lunch peak period. Based on this assumption, the average pedestrian volume would reach a maximum of 1.4 PFM immediately adjacent to the site, where the sidewalk would be expanded, and would reach a maximum of 3.1 PFM east of the site where the sidewalk would remain at its present width. During the lunch period, peaks would occur during which the pedestrian volume would rise temporarily above 3.1 PFM.

Because the increase in pedestrian volume would be offset by the expansion of the sidewalks, the sidewalk areas immediately adjacent to the proposed building would not experience a change in their level of service. The area of these sidewalks would allow pedestrians to choose their own walking speed, to bypass slower pedestrians, and to avoid crossing conflicts with others. The Bush Street sidewalk immediately west of the site would provide a similar level of service.

The Montgomery Street sidewalk immediately south of the site would receive the greatest increase in pedestrian volume. Presently it has the same level of service characteristics as the sidewalk areas described above. If the volume is increased by 12.5%, pedestrians would have a more difficult time setting their own walking speed since it would be more difficult to pass slower pedestrians. If the volume is increased 25% or greater, freedom to set one's own walking speed and to pass slower pedestrians easily would be severely restricted. There would be a high probability of conflict with oncoming persons requiring frequent adjustment of speed and direction to avoid contact.

7. Construction Impacts on Traffic, Transit, and Pedestrians

Peter Woo of the Bureau of Traffic Engineering, Department of Public Works estimated that, based on previous projects, the sidewalks and one-half of the curb lanes of Bush Street and Montgomery Street would be closed during the 20-month construction period. This area would allow room for the storage of materials and operation of equipment, and would act as a buffer which would protect passing pedestrians and vehicles in the event of any falling objects. The developer would be required to build a wall and covered walkway in the remaining one-half of the curb lanes which would protect passing pedestrians and vehicles from demolition and construction activity. The temporary walkway would be one-half the width of the existing sidewalks.

The narrowing of these streets and sidewalks would reduce Bush Street from approximately 40 feet in width (two 10 feet wide traffic lanes and one approximately 20 foot wide lane which accommodates both traffic and a bus stop) to approximately 30 feet in width. If the bus stop adjacent to the site on Bush Street were relocated during the construction period, the reduction to a 30 foot street width would not require the abandonment of any traffic lanes. The narrowing of Montgomery Street would reduce the width of the street immediately from approximately 40 feet to approximately 35 feet. This narrowing would cause the number of traffic lanes to be reduced from four to three. The sidewalks on both streets would be reduced in width by approximately one-half, which would cause their level of service to diminish if their were no reduction in flow. During peak periods some pedestrians and motorists would seek alternate routes, thereby increasing the vehicle and pedestrian traffic on those routes.

Any deliveries of equipment or supplies would have to made directly to the site via Bush Street. No back-up of trucks or equipment on Bush Street would be allowed by the City[1] although inevitably some delays in traffic would occur on Bush Street because of trucks entering and leaving the site.

All of the above points would have to be discussed by the developer with appropriate City departments before any work would be allowed to begin.

H. AIR QUALITY

The air quality impacts of the project are primarily the effect of vehicular emissions on regional air quality, particularly oxidant formation, and on local pollutant concentrations, particularly carbon monoxide.

The project is estimated to generate the following vehicle-miles of travel, and based on Bay Area Air Pollution Central District (BAAPCD)[2] factors, the listed quantitites of emissions:

TABLE 11

ESTIMATED VEHICLE MILES

Residence of Building Occupants	Est. Week Day Motor Vehicle Round Trips Generated by Project		Estimated Mileage of Round Trip		Est. Vehicle Miles Traveled Per Weekday
San Francisco	216	x	10	=	2,160
San Mateo Peninsula	250	x	40	=	10,000
East Bay	263	x	40	=	10,520
Marin/Sonoma Co.	226	x	40	=	9,040
Total	955				31,720

1. Conversation with Peter Woo, Bureau of Traffic Engineering, Department of Public Works, based on requirements placed on previous construction projects, August 1976.
2. BAAPCD, Guidelines for Air Quality Impact Analysis, 1975, based on an average trip speed of 20 miles per hour.

TABLE 12

ESTIMATED DAILY VEHICLE EMISSIONS
GENERATED BY THE PROJECT

Pollutants	BAAPCD 1980 Emissions Rates grams/mile	Project Vehicle Miles Per Day	Metric Tons/Day 1980 Emissions from Project	Metric Tons/Day Est. 1980* Bay Air Basin Em.	Project/ Basin Emissions %
Carbon Monoxide	16.8	31,720	0.533	2,500	0.021
Organics	2.4	31,720	0.076	950	0.008
Nitrogen Oxides	2.8	31,720	0.088	750	0.012
Sulfur Oxides	0.18	31,720	0.006	700	0.001
Particulates	0.28	31,720	0.009	200	0.004

*BAAPCD, Source Inventory of Air Pollutant Emission in the San Francisco Bay Area, 1973.

As seen in the above table, vehicular emissions generated in the region by the proposed project are estimated to increase air basin emissions of organics and nitrogen oxide by 0.021% and 0.008%, respectively, based on BAAPCD 1980 emission rate expectations. This could increase if technological modifications to vehicles do not occur as anticipated.

However, the cumulative impact of employment growth in downtown San Francisco, of which this project represents one increment, has greater impact. Employment in the downtown area north of Market Street is projected to increase by 35,000-51,000 jobs in the years 1973-2000. Hypothetically, if the travel patterns used for the proposed project (resulting in 13.4 vehicle-miles/person) and the BAAPCD 1980 vehicular emissions rate were applied to a projected employment growth of 35,000 persons, the additional organics and nitrogen oxides generated would be:

	Additional Persons	Vehicle Mile Person	Add'l Vehicle Miles	Emmission Rate g/mile	Est. Add'l Emissions Metric tons/day	Est. 1980 Air Basin Emission met. t/day	Add'l Basin Emissions %
Organics	35,000	13.4	469,000	2.4	1.13	950	0.118
Nitrogen Oxides	35,000	13.4	469,000	2.8	1.31	750	0.175

These hypothetical emissions represent an impact roughly 15 to 22 times that of the proposed project (based on an employment range of 35,000-51,000 persons compared to the proposed 2330). However, the actual impact is dependent upon factors of place of residence, mode of transportation, and vehicular emissions rates that are subject to substantial variation with time.

Afternoon peak hour vehicle trips were estimated on page 73 to be increased by the proposed project approximately 6.8% on Montgomery Street and 5.5% on Bush Street. Impact on carbon monoxide concentrations on those streets would be proportional, or somewhat greater, because of an increased percentage of trip time that the motor would be idling due to heavier traffic. Street loading would be increased by the proposed project from approximately 66% of capacity to 70% on Montgomery, and from approximately 81% to 86% on Bush.

Existing carbon monoxide concentrations, discussed in Chapter III and in Appendix E, are estimated to exceed state and federal one-hour standards on heavily traveled segments of Bush and Montgomery streets under adverse wind and air stability conditions, assuming EPA 1972 vehicular emissions rates. This condition may be experienced on the order of several days per year, and its likelihood of occurrence would be increased by the proposed project. Assuming BAAPCD 1980 vehicular emissions rates, far lower carbon monoxide concentrations are indicated with no violation of the one-hour standards for this pollutant. Increased emissions resulting from the proposed project would not change this condition as based on BAAPCD 1980 emissions rates.

The total cumulative growth of the downtown would have greater impact, but complex analysis is necessary to determine the extent. New buildings would be in locations scattered through the area, and chosen travel routes through the downtown vary with short-term conditions and city street control measures.

As discussed in the transportation section, data indicate roughly 53% of downtown office employees use private automobiles for home to work travel. Although increasing traffic congestion and increased competition for parking are a constraint to use of automobiles, increased loading on available transit systems is a counter force. Unless particular Muni lines and other transit systems serving the downtown expand capacity to accommodate growth in employment in the downtown area (including that growth related to the proposed project), an increased rate of private auto use with resulting air emissions will be encouraged.

Demolition and construction could result in quantitites of airborne particulates. The quantity would be dependent upon the degree of control exercised by the contractor, particularly through wetting down potentially dusty areas and wetting or covering debris on trucks, and would have to be done in accordance with the requirements of the Department of Public Works and as overseen by the Department.

I. MICROCLIMATE

Wind tunnel tests were conducted on a scale model of the proposed building to determine its probable effect on wind and pedestrian comfort near the site.

The site currently has low to moderate[1] winds compared to other areas of San Francisco. Winds vary considerably with location near the project; the highest winds are found on the east side of Montgomery Street north of the site. The area is shadowed during all seasons.

---

1. Low to moderate winds are defined as winds of less than 50% of the force of winds experienced at the San Francisco Federal Building location. See Appendix F, section VII, Technical Data and Discussion.

The effect of the proposed building on winds would vary with location, with some areas experiencing increases and others decreases. Winds would be increased close to the site and would decrease along Montgomery Street opposite the site and to its east along Bush Street. The project would increase shadows along Bush Street across from the site in spring, summer, and fall. The plaza area would be shadowed all year.

The project would increase pedestrian discomfort due to chilling by wind.[1] The greatest increase would occur on the north side of Bush Street, where both winds and shadows would increase. Wind forces would be increased by approximately 66% directly in front of the Mills Building entrance. East of the site, comfort would improve due to lighter winds. One bus stop, the block long stop on the south side of Bush Street between Montgomery and Sansome, is affected; wind forces on the stop would be increased in front of the proposed building, but decreased east of the proposed building.

The detailed microclimate impact analysis is provided in Appendix F, page 153.

J. NOISE AND VIBRATION

The area in the vicinity of Bush and Montgomery has a daytime ambient noise level of 75 dBA[2] and an ambient average peak noise level of 85 dBA.[3] During the 20-month construction period, erection of the proposed building

---

1. See Appendix F, Table 1, page 170.
2. The dBA is a weighted measure of sound pressure which approximates the human physiological response to noise under conditions which include urban sound levels.
   Ambient noise is the all encompassing noise associated with a given environment, being a composite of sounds from many sources, near and far. The ambient noise level is the average ambient noise level which occurs 90% of the time.
3. Ambient average peak is the average of the peak ambient noise levels which occur 10% of the time.

would cause construction noise and vibration. All construction equipment, with the exception of impact tools and equipment (jackhammers, pile drivers, associated compressors, etc.) would have to meet the San Francisco Noise Abatement and Control Ordinance[1] requirements prohibiting any noise in excess of 86 dBA when measured at 50 feet from the equipment. It is the opinion of Cormac Brady of the Department of Public Works and Robert MacDonough of the Department of Public Health,[2] the city officials responsible for the enforcement of the Noise Abatement and Control Ordinance, that the regulated construction equipment would not add a perceptable amount to the existing daytime ambient noise levels in the vicinity of the site.

The impact tools and equipment, particularly the piledrivers which would be used during the foundation, would have an impact on the surrounding environment. A piledriver operating at a construction site has a noise level of approximately 100 dBA,[3] which would be 15 dBA above the proposed site's peak average ambient level. According to Federal Highway Administration Noise Standards,[4] the standards used by the Department of Public Works, an increase of 10 dBA above the average peak ambient level would result in "great" intrusion on conscious thought and conversation.

With regard to the noise impact on offices adjacent to the site, the noise from the piledriver would be attenuated by the material of these

---

1. City and County of San Francisco, San Francisco Noise Abatement Ordinance No. 274-72, Section 2907 Construction Equipment, December 4, 1972.
2. Conversations with Robert MacDonough, Environmental Inspector, San Francisco Department of Public Health, and Cormac Brady, Mechanical Engineer, San Francisco Department of Public Works, December 22, 1976.
3. Cormac Brady, ibid.
4. Federal Highway Administration, Federal Highway Program Manual, Vol. 7, Chapter 7, May 14, 1976

buildings by approximately 20 dBA,[1] resulting in a noise level from the piledriver of approximately 80 dBA. The average office has an ambient noise level of 70-75 dBA.[2]

K. BIOTA

Lnadscaping for the proposed plaza area is expected to include plant material, but the character of landscaping has not been determined at this time. Selection of suitable species would be difficult due to the wind exposure and lack of sunlight in the proposed plaza. Street trees on the Montgomery Street side of the site would be removed during the construction period, but replaced in the final phase. No landscaping anticipated would be a likely habitat for animal species.

L. ENERGY USE

The connected kilowatt load of the project is estimated by the project architect/engineer at 5400 kilowatts. The estimated average kilowatt hours of monthly consumption required to service all electrical needs: (1) in absolute amount are estimated at 620,000 KWH, and (2) per square foot interior space are estimated at 1.6 KWH. Anticipated daily and annual electrical load distribution curves are shown in Figure 18.

Estimated average consumption of fuel oil (fossil fuels) in British Thermal Units (BTU's) per square foot of interior floor space per day is estimated by the project architect/engineer as 123 BTU/square foot/day. The maximum peak demand of fossil fuel consumption would be 8 million BTU/

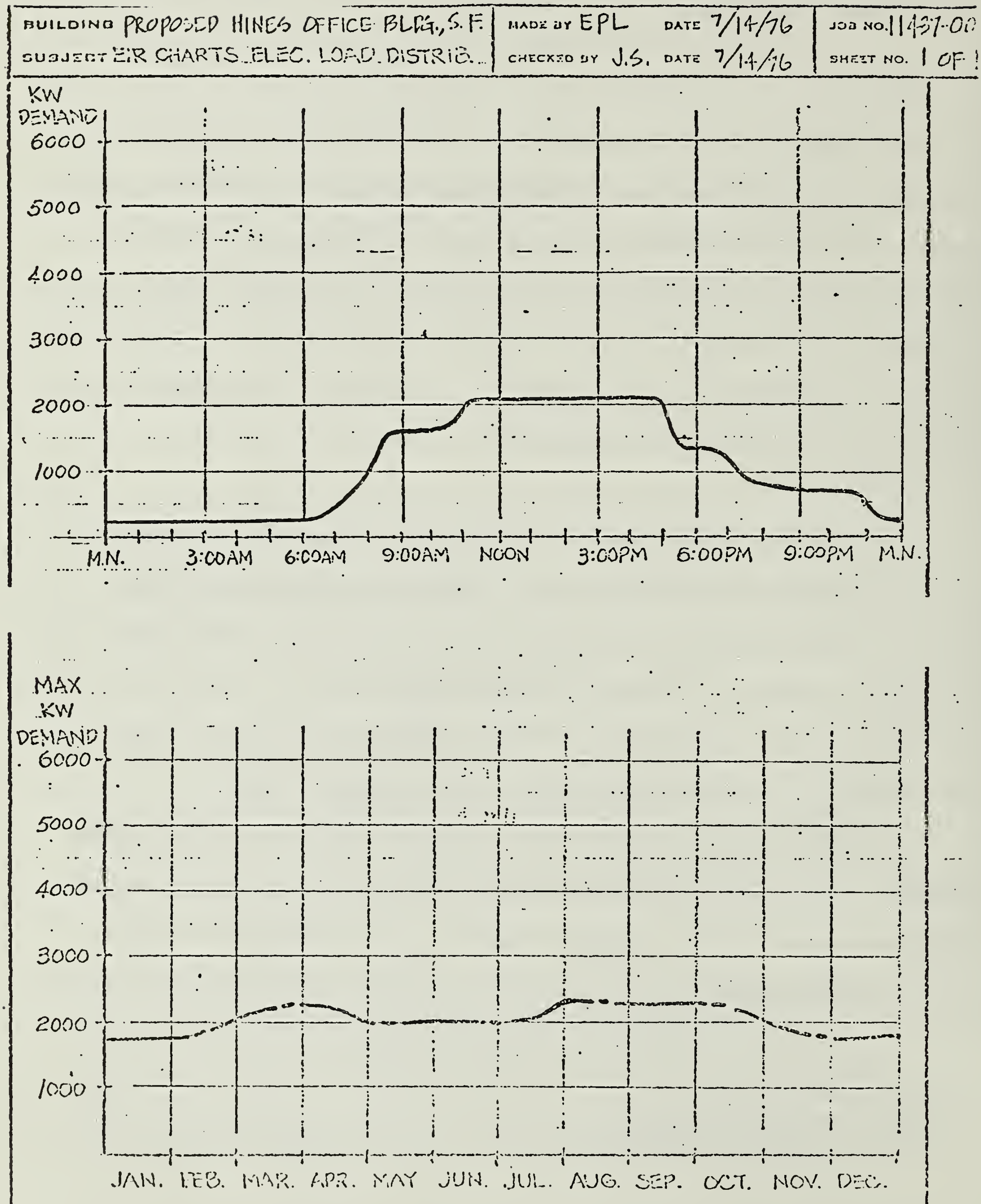
---

5. Robert MacDonough, op. cit.
6. Robert MacDonough, ibid.

FIGURE 18

ANTICIPATED DAILY AND ANNUAL ELECTRICAL

LOAD DISTRIBUTION



Source: Skidmore, Owings & Merrill, Architects & Engineers.

hour. Anticipated daily and annual load distribution curves for fuel oil consumption are shown in Figures 19 and 20. Use is primarily for space heating and hot water.

Since the mechanical and electrical systems for the proposed building have not yet been designed, the engineers have derived the data by extrapolation from the California First Bank Building[1] being built at California and Sansome streets,[2] also designed by Skidmore, Owings & Merrill, Architects-Engineers, and from PG&E meter readings of several existing local office buildings adjusted for this project. The proposed building is 11% larger than the California First Bank Building, the conversion efficiency of oil is 11% less than gas (the fuel used in the California First Bank Building), and the proposed building is estimated to be 11% more energy efficient than the California First Bank Building. The worksheets of the engineers are contained in Appendix G, page 187.

M. WATER USE

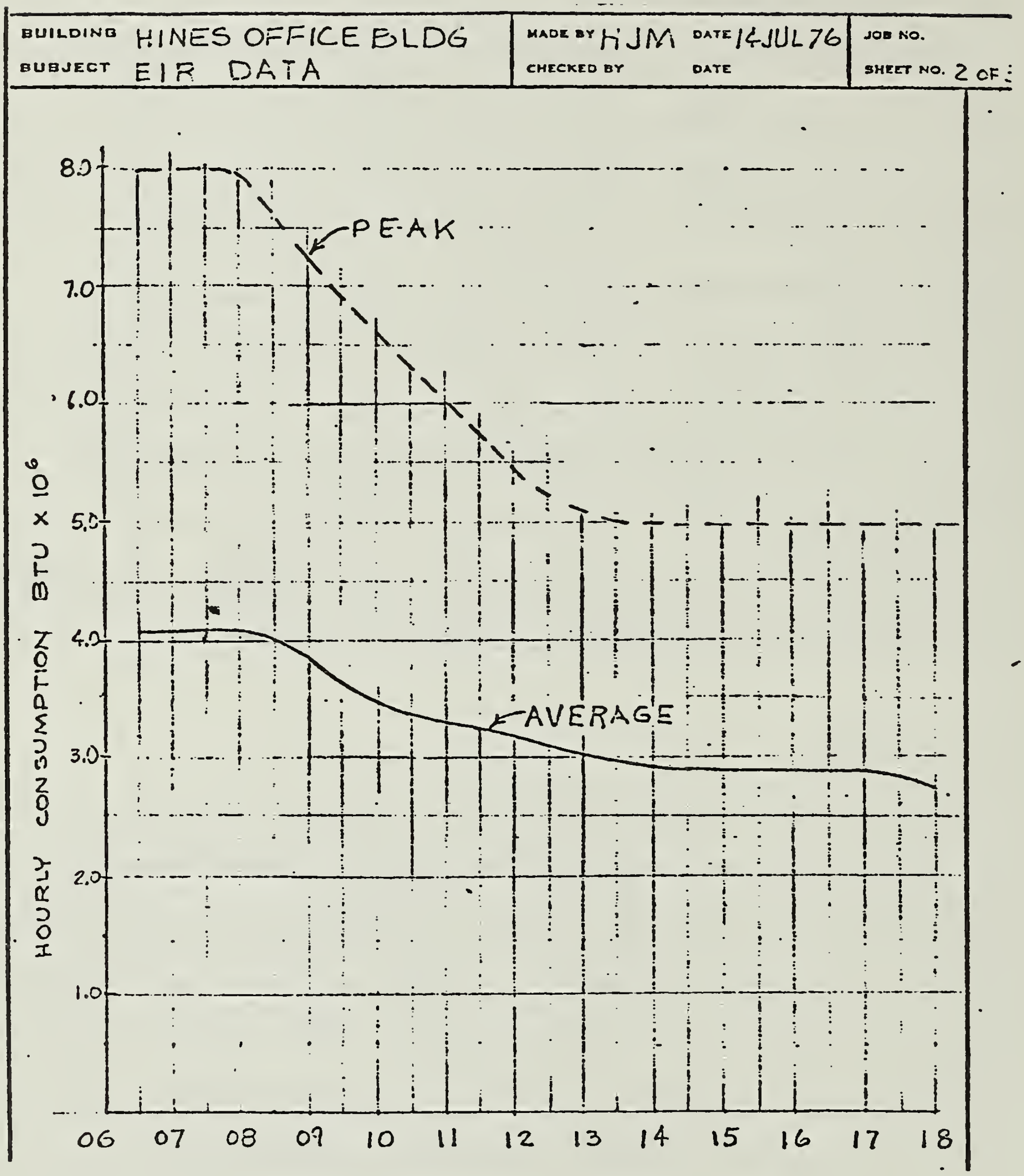
Water would be required for domestic use such as sanitation, drinking, and cooling tower operation. The project architects/engineers, Skidmore Owings & Merrill, on the basis of their experience with similar buildings, state that they expect the proposed building to consume approximately 15 gallons of water per day per building occupant. This results in approximately 35,000 gallons of water per day that would be required to serve 2360 occupants of the proposed building. In addition, the design engineer calculates that the cooling system will consume from zero to 12,000 gallons per

---

1. Final Environmental Impact Report EE 74.170.
2. This extrapolation was discussed with Alec Bash of the Office of Environmental Review, July 1976.

FIGURE 19

DAILY FUEL OIL DISTRIBUTION CURVE



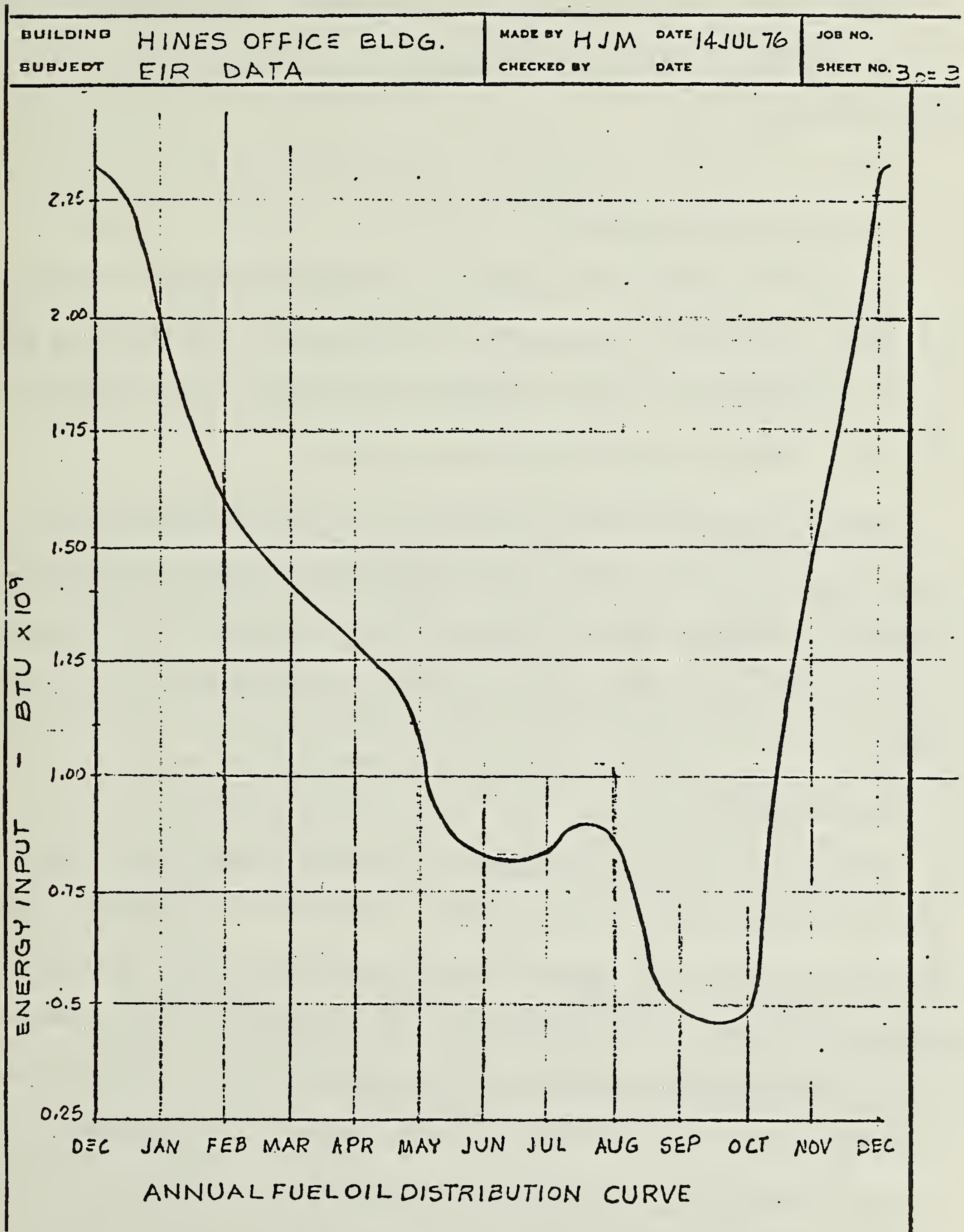
TIME OF DAY*

*Design assumes that the heating/cooling system will operate only on a 0600-1800 basis and no fuel oil will be consumed at night. This assumption will be revised only if energy consumption is thereby reduced.

Source: Skidmore, Owings & Merrill, Architects & Engineers.

FIGURE 20

ANNUAL FUEL OIL DISTRIBUTION CURVE



Source: Skidmore, Owings & Merrill, Architects & Engineers.

day of water, depending on the level of operation and the weather. This cooling consumption would be the result of losses due to evaporation, wind drift, and periodic bleeding of the system to reduce mineralization. Total consumption is therefore estimated to vary from 35,000 to 47,000 gallons per day.

N. SURFACE AND GROUNDWATER

The site is presently covered by buildings; no changes in drainage and runoff are expected as a result of replacement of the existing buildings by the proposed building. Runoff would continue to be directed into the city's combined storm-sanitary sewer system.

As site excavation would be limited to the depth required for a single basement and the foundations, the developer's consultants expect groundwater problems during construction to be limited. Any water that does enter the excavation would be pumped into the storm-sanitary sewer system.

O. LIQUID WASTES

The project architects/engineers, Skidmore, Owings & Merrill, on the basis of their experience with similar buildings, state that they expect the proposed building to generate approximately 15 gallons of liquid waste per day for each person employed in the building. This results in approximately 35,000 gallons of liquid waste per day that would be discharged into the city's sanitary sewer system. The discharge will be handled by the North Point Sewage Treatment Plant, and would constitute

.06% of its average dry weather flow of 60 million gallons per day.[1] The capacity of the North Point plant is exceeded during rainy weather. During these periods the plant operates at capacity and discharges the excess into the San Francisco Bay at the Main and Howard streets outfall.

The overflows have caused the San Francisco Bay Regional Water Quality Control Board to cite the North Point plant because it does not comply with water quality standards established by federal and state law.[2]

Implementation of the Wastewater Master Plan,[3] which calls for eventual phasing out of the North Point Water Pollution Control Plant, will ultimately lead to substantial compliance with the requirements of

---

1. Conversation with Lou Vatadori, Bureau of Sanitary Engineering, Department of Public Works, December 23, 1976.
2. San Francisco Bay Regional Water Quality Control Board, Cease and Desist Order, Resolutions 67-2, adopted 11/19/67; 73-55, adopted 6/26/73; and 73-54, adopted 9/25/73. Cease and Desist Order amended and new compliance schedules set 12/6/74, Order No. 74-159. Cease and Desist Order No. 76-58 prohibits any new discharges to the sewer system tributary to the North Point Water Pollution Control Plant, meaning that no new sewer connections are allowed while this Order is in effect. Order No. 76-67, dated 6/15/76 lifts this prohibition only for those projects completely processed and awaiting building permits as of 6/15/76. Order No. 76-81, dated 7/20/76 lifted the sewer connection prohibition again only for those projects completely processed and awaiting building permits as of 7/20/76. Order No. 76-92, dated 8/17/76, did the same for projects otherwise processed as of 8/17/76.

   Robert Cockburn, Bureau of Sanitary Engineering, Department of Public Works, stated on 3/29/77 that the Order was again amended in February, 1977, setting a new schedule for system development permitting new connections as long as the schedule is complied with. This schedule requires adoption of a City revenue program for the sewer system construction projects by May 15, 1977, and completion of Southeast Plant construction, the last element of the system, by June 23, 1980.

3. U.S. Environmental Protection Agency and City and County of San Francisco, Final Environmental Impact Report and Statement: San Francisco Wastewater Master Plan, May 1974. See also Final Environmental Impact Reports for Implementation Projects I, III, and VIII, for the Wastewater Master Plan.

the RWQCB. When the plant is phased out, dry weather flows from this service area will be transported to the Southeast Water Pollution Control Plant for treatment and discharge, and wet weather flows are expected to be transported to a proposed treatment plant in the southwestern area of the city for treatment and discharge. In the interim the North Point facility will continue to operate as a treatment plant until the Southeast plant is expanded, at which point the North Point plant will operate only during wet weather.

P. SOLID WASTES

The amount of solid waste generated by the proposed building for disposal has been estimated on the basis of the California Solid Waste Management Control Board's generation factors of one pound per 100 square feet of floor space or 2.8 pounds per capita per day for metropolitan commercial refuse.[1] Since the application of these factors generates slightly different estimates, the amount of solid waste generated has been given as a range. Based on these factors, the project would generate an estimated 1.8 - 2.0 tons of solid waste per day, or approximately 0.0004% of San Francisco yearly refuse.

Golden Gate Disposal Company, which is under City contract in the project area, would place the waste in a holding area at 501 Tunnel

---

1. California Solid Waste Management Board, Solid Waste Generation Factors in California, Bulletin No. 2, Technical Information Services, July 8, 1974.

Avenue in San Francisco and then transfer the waste to the Shoreline Regional Park Sanitary Fill Project in Mountain View. The existing site accommodates San Francisco through 1980. There currently exists a proposal under review to incorporate a new area which would accommodate San Francisco until 1983.[1]

This amount of solid waste would require daily removal. It would be picked up at the building's service vehicle area, accessed off Bush Street.

Q. POLICE

The San Francisco Police Department estimates that the proposed building would generate 47.4 incidents per year requiring police attendance. Their estimate is based upon the number of incidents reported for 1975 in the Census tract of the proposed site, producing a ratio of 20.09 incidents per 1000 population (combined day and night population peak). They state that "the proposed project could cause an increased demand for police services."[2]

R. FIRE PROTECTION

The San Francisco Fire Department states that there is adequate water supply for fire fighting, that the proposed construction would create no

---

1. Conversation with Richard Haughey, Assistant Engineer, City of Mountain View, January 6, 1977.
2. San Francisco Police Department, Environmental Impact Report - Evaluation of Police Services for Arthur D. Little, Inc., July 1976. File Number - PR 396 (available for review at the San Francisco Department of City Planning).

additional need for fire fighters or equipment, and that the impact of the building and its impact in combination with other new and proposed downtown development "will not have an adverse effect on the fire protection services as now provided."[1]

1. Letter from Robert E. Rose, Chief, Division of Planning and Research, San Francisco Fire Department (available for review at the San Francisco Department of City Planning).

V. MITIGATION MEASURES PROPOSED TO MINIMIZE THE IMPACT

A. SEISMIC HAZARD

If the proposed project were approved, a soils investigation of the site would be made to analyze the specific susceptibility of the site to liquefaction, subsidence, and movement. The information from such a soils analysis would be used with the City's structural design requirements to develop the design for the building. This procedure conforms with Policy Four of the Community Safety Element of the Comprehensive Plan of San Francisco which in part states that ... "Special site investigations should be required in these (geological) hazard areas to determine the actual hazard, if any, for all proposed new development. Based upon the findings of this site investigation and determination of type and degree of (geological) hazard present, appropriate engineering design should be required to ameliorate this (geological) hazard.[1]

B. HISTORICAL AND ARCHAEOLOGICAL IMPACTS

The historical landmarks plaque would be remounted in a prominent place on the proposed building, as requested by the Landmarks Preservation Advisory Board.

If anything of potential archaeological or historical import is found on the site, the contractor will be legally bound by its contract to stop construction to permit professional evaluation of the finds, in accordance with city environmental guidelines.

---

1. City of San Francisco, Department of City Planning, A Proposal for Citizen Review, Community Safety Plan for the Comprehensive Plan of San Francisco, July 1974, p. 43.

C. SCENIC, ARCHITECTURAL AND LAND USE IMPACTS

The visual replacement of three existing building facades by one new office building would be mitigated by the developer's proposal to increase street level retail space from 2000 sq. ft. of existing buildings use (prior to purchase) to approximately 4120 sq. ft. Ground floor office uses that existed in the present building would be entirely eliminated. With effort to enhance the character of this retail space in ways that maximize visibility and use by pedestrians on the street (e.g., use of windows, light levels, display design, access) would add color and activity to the street. Provision of a plaza area open to the public as proposed would further add to the pedestrian amenities of the street.

This would be maximized in the view of the City Planning Department if all the retail space were used for shop or eating/drinking type retail activities, and retail banking functions at the street level were avoided. Two thousand sq. ft. of retail banking existed in the Gibraltar Savings and Loan Building prior to purchase, and the developer indicates that allowing retail banking on the street level of the new building is an important incentive to attracting prospective bank administrative office tenants. It is uncertain at this time if any space would be leased to a retail banking function. If it were to occur, the developer and his architectural consultant state that design of the space could minimize "institutional" characteristics and emphasize the color, people, and activity that add interest to the street scene.

Provision of increased areas of retail space by placing it at a second floor or below grade level is possible but constrains its accessibility and use. The developer believes that this would be financially infeasible in this project, and that such a location for a retail banking facility in particular would be unattractive to prospective tenants.

The developer proposes to construct a plaza area open to the public to further add to the amenities of the street. Physical use of the space by people is constrained by access, the fact it is in constant shadow, and by exposure to wind. The position of the plaza is determined by an air-rights easement above the roof level of the existing Title Insurance building and by geometry of the site. Additional visual and physical access may be possible through the larger retail space, however. Wind and chill characteristics could be reduced with the use of protective roof elements (e.g., skylights) at additional cost. However, the City Zoning Administrator must determine if such a measure is allowable and, if implemented, whether it would sufficiently mitigate adverse conditions to ensure a useable plaza. The provision of plaza spaces is encouraged by the City by allowing a "bonus" of additional floor area to be constructed on the site in compensation. Wind impacts on the proposed plaza could also be reduced by placing it below grade, or by placing a glass wall with a door (preferably revolving) on the ground-level passage south of the building between the proposed project and the French Bank Building. Further amenities to encourage public use could include art works, a small food service kiosk, tables, and landscapings.

The detailed design of the face of the proposed building can be executed in a manner that mitigates against peoples' reaction of "cold" and "sterile" new high-rise office buildings contrasted to "warm" and "familiar" old buildings. This is in part a matter of use at street level of elements of human scale, of elements that invite pedestrian interest and visual participation, and of elements that stimulate associated pleasant memories. It is in greater measure a matter of high-quality architectural design. The Project Review section of the City Planning Department would examine the final building design prior to the City issuance of a building permit.

The design of the exterior of the building would conform to City guidelines in general in that light-colored materials would be used, and visually strong, dominant, or contrasting elements in the building facade would not be used, as suggested by the Department of City Planning.

D. TRANSPORTATION AND CIRCULATION

The project would not provide parking, which is consistent with the City's plan to limit auto traffic in the downtown area. This goal could be further realized by the City taking action to constrain parking availability or use within or on the edge of the downtown area (e.g., cost increases, prohibition of construction of additional private auto parking facilities).

The developer's representatives would meet with the appropriate City departments to minimize any inconveniences to traffic and pedestrians during the construction period. Efforts that could be devised with the City to speed up the demolition and construction process would lessen the amount of time that portions of Bush and Montgomery Streetw would have to be barricaded.

The present plan calls for the widening of the sidewalks from 12 to 32 feet on Montgomery and from 15 to 35 feet on Bush immediately adjacent to the site.

The chosen site is near a variety of transit systems, which mitigates the tendency of higher-income office buildings to increase automobile usage.

E. AIR QUALITY

The project discourages automobile usage by not providing parking facilities, thereby tending to reduce the air pollutants resulting from this project.

Airborne dust resulting from construction operations would be abated by wetting or oiling haul roads; by wetting dusty areas during excavating and grading operations, as well as during windy weather; by wetting or covering dusty materials loaded on trucks; and by keeping City streets, sidewalks, streets trees, and other plant material free of dust, mud, load spillages, rubbish, and debris resulting from construction equpment and operations.

F. MICROCLIMATE IMPACTS

Reduction of induced wind force at street level typically requires extending a lower floor out in front of the tower element to deflect the wind above the street level, major physical protuberances from the face of the tower to break up the flow of air down the face of the buildings, or major reconfiguration of a complex form or reduction in height to avoid catching and channeling the air initially. The small size and geometry of the proposed site make stepping back the tower impractical. Large projecting elements are undesirable on visual, seismic, and cost grounds. Reduction of building height would tend to proportionally reduce the increase in generated wind forces, but also reduces financial return to the developer.

The provision of a sidewalk area under the building as proposed would provide protection from wind forces to pedestrians at the base of the building. This protected area would also shelter persons waiting for buses at the Bush Street bus stop, which extends the full block between Montgomery and Sansome. Wind forces east of the site along this bus stop would be reduced as a result of the proposed project.

The provision of a sidewalk area under the building as proposed would provide protection from wind forces to pedestrians at the base of the building. Mitigation of wind forces and chill in the proposed plaza area is discussed above under Scenic, Architectural and Land Use Impacts, page 98.

G. NOISE IMPACTS

Noise impacts can be mitigated by a variety of techniques including shielding of equipment, installation of mufflers, modification of construction operations, or selection of specific types of equipment to generate minimum noise (e.g., drill or vibrate in piles rather than drive them by impact), and by provision of sound insulating measures at sensitive receivers.[1] If it is determined that a violation of the City noise ordinance exists, representatives of the Department of Public Works would meet with the contractor and determine a method of correcting the problem that is deemed appropriate to the specific conditions. No violation is now anticipated.

H. BIOTA

During construction, street trees would be removed from the site. Replacement of these trees and the incorporation of additional landscaping into the final design of the proposed building would enhance the site.

---

1. For further discussion of mitigation measures, see "Construction Noise Control," a document in draft form prepared by the Bureau of Engineering of the San Francisco Department of Public Works.

I. ENERGY USE

Energy conservation is a primary design objective today, both because of the cost of energy and because of recent legislation that mandates conservation measures. The building design engineers comment below on four specific considerations:[1]

"A. Natural Ventilation: Natural ventilation is impractical on the building interior spaces. Although it can be done with operable windows for perimeter spaces, energy is only one consideration. Other considerations include temperature comfort levels in the summer, wind, street noises, infiltration of unfiltered air (as it affects house cleaning) and investment costs.

"The use of operable windows in lieu of mechanical ventilation and cooling would obviously reduce energy consumption. Such reductions would be partially offset, however, by additional heating energy requirements to overcome infiltration of cold air through window cracks.

"B. Alternate Mechanical Systems: A variable air volume system is planned for this project. This system is more energy conserving than other systems that might be considered. Such other systems include reheat, multizone, double-duct, air-water induction, fan-coil, package units, electrohydronic and through-the-wall.

"The planned air system will incorporate an economizer cycle to optimize the percentage of outside air and employ, to the extent possible, free cooling with 100% outside air, with the chillers off.

" C. Double-Glazing: The building temperatures are maintained in the range of 68° - 78°F. The average outdoor temperature is approximately 55°F. The outdoor temperature is in the range of 50° - 75°F approximately 79% of the time. During these hours there is either (1) no heat conduction through the windows, or (2) heat transfer from the building to the out-of-doors. This heat transfer is constructive since it naturally removes from the building the heat generated by lighting, machines, and people.

" The value of double-glazing in the San Francisco climate is quite doubtful for major office structures.

" D. Solar Energy: In this comparatively mild climate, passive solar energy (i.e., solar radiation through windows) already provides a significant amount of the building space heating requirements. Use of active solar energy collectors requires much more area than is available on the roof of the building, and the west and north faces of the building are functionally inappropriate."

---

1. Carl Jordan, mechanical engineer, Skidmore, Owings & Merrill, Architects-Engineers, memorandum dated December 23, 1976 and personal communication.

VI. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF THE PROPOSAL IS IMPLEMENTED

Implementation of this proposed office building would result in adverse impacts on traffic and people due to construction activity, and in general increased congestion and demand for services in the downtown area after the building is occupied. Adverse impacts that cannot be further mitigated include the items below.

The project would result in an increased use of private automobiles in the downtown and region, with attendant congestion and air pollutant emissions impacts. The number of pedestrians in the finance and administrative district and downtown would also be increased. The curb lane of the street on both sides of the site would be lost to traffic use and pedestrian movement relocated to a temporary sidewalk during construction.

Demand on public transit would increase, as would demand for other public services such as police, fire protection, and utilities. While this increment of additional loading would not exceed the existing capabilities of any service element other than transit, the continued growth in downtown office related uses has required an expansion of service capacities (e.g., new sewage treatment facilities, acquisition of new Muni vehicles).

The existing low-rise buildings on the site would be demolished, including the E.F. Hutton Building. The proposed building would be a 26 to 29-story high-rise office tower of different design character. Buildings near the site are also largely high-rise. Sunlight reaching the street would be reduced and wind forces increased.

The proposed office building would consume nonrenewable material and energy resources in construction and in operation.

VII. ALTERNATIVES TO THE PROPOSED ACTION

A. SITE ALTERNATIVES

The developer seeks a location in the core of the finance and administrative district in order to offer building tenants the maximum advantages of proximity and visual exposure to other offices and elements of the district. A site search was conducted by Grubb and Ellis which resulted in identification of the proposed site.

Office building development serving central financial/administrative functions in the City of San Francisco is occurring primarily in the finance and administrative district, with secondary activity in proximate areas. Although individual tenant needs vary, the greatest demand for and value of office space is within the core of the finance and administrative district, comprising the area bounded by Kearny Street to the west, the Embarcadero to the east, Washington Street to the north, and Market Street to the south. Demand is highest for office space in the Montgomery corridor within this area.

Of the 47 blocks of property bounded by public streets in that area, Grubb and Ellis report that 31 are not suitable for consideration for development in the near future because of age of existing structures, investment commitment, tenant commitment, and other similar constraints. Few of the remainder were of size and configuration to result in a cost efficient building.[1]

---

1. An office building is designed to minimize gross area and construction cost, and maximize rental area. Important considerations include appropriateness (to the tenant market) of the size and dimensions of a rental space on a floor, and the avoidance of floor and building configurations that are expensive to build and difficult to divide up into rental office space efficiently. Site size, configuration, access, and zoning are all critical determinants.

Further consideration of site price and the attractiveness of location to a tenant market narrowed the selection to the proposed site.

Although office buildings are being built outside the core finance and administrative district defined above, the areas south of Market and in the Yerba Buena Center are considered by the project sponsor to be peripheral to the area of maximum business activity, prestige, and related demand for office space. Office building development in those areas is usually undertaken on the basis of the commitment of occupancy by a large corporation, either on an ownership or lease basis, which finds the conditions of setting and cost to be acceptable to its needs. Corwin Booth and Michael T. Hall propose to develop a building to meet the demand by smaller, professional firms for office space in the core area.

Other sites outside the core finance and administrative district, in San Francisco and elsewhere in the Bay Area, are available for office building construction but do not offer the market characteristics which are the objective of the developer: a highly concentrated demand for high-rental office space by small firms.

The construction of an office building south of Market would have less impact on pedestrian and vehicular congestion than a similar sized building in the finance and administrative district because of the lower density of development that exists there. However, an increased proportion of occupants might use private automobiles because of proximity to cheaper parking, with consequently increased regional transportation system and air quality impacts.

B. USE ALTERNATIVES

The use zoning of the proposed site, C-3-0, allows office and retail commercial land uses. Limited retail commercial would be included in the proposed project. The developer, based on personal knowledge of the retail space market in the area, indicates he finds demand does not exist to financially support increased space in this function in his proposal.

The Residence Element of the San Francisco Comprehensive Plan, as revised and adopted in public hearing December 11, 1975, by the Planning Commission, states as Policy 2 of Objective 2:

> "Encourage the conversion of under-utilized non-residential land to residential use, and encourage new residential development in the downtown area... The City should encourage multiple residential development in conjunction with commercial use in the downtown commercial area."

An anticipated principal benefit of such residential development would be the reduction of traffic generated by downtown activity and employment, and the stimulus to 24-hour activity in an area now dominated by work day office employees.

However, residential units generate approximately one-third of the rent per square foot that proposed office uses do, which seriously constrains investment. The developer believes this is not an acceptable economic return on investment in this real estate.

The present zoning codes would require a Conditional Use authorization by the City Planning Commission for dwelling units within a C-3-O district. In addition, provision of parking in the project would be necessary for marketing attractiveness.

The site could also be used as a public urban park. The closest such park to the site at present is Crocker Plaza, two blocks south on Market Street at Montgomery. Such spaces are extremely popular in densely crowded areas such as the finance and administrative district. Use tends to be heavy during the lunch period, but light during the remainder of the work day. This particular site experiences extensive periods of shadow, being on the north and west sides of two tall office buildings. It is also exposed to the winds generated by those buildings. At present, the site would have to be purchased on the open market at a price determined by maximum office

development potential, and demolition of part or all of the existing structures would be necessary. Existing and potential tax revenues would also be lost.

C. DESIGN ALTERNATIVES

The project as proposed utilizes roughly all the area allowed by city code. The boundaries of the tower are as defined by code property lines and an air rights easement. The typical floor area dimensions could not be reduced without decreasing the potential individual office unit area and its dimension below that believed by the developer to be responsive to market demand.

Areas which would not be enclosed are the proposed arcade around the building, a proposed plaza area under the air rights easement (which extends down to the level of the roof of the existing Title Insurance Building) and the proposed plaza area behind the French Bank Building (see Figure 3, page 8). These open space uses are proposed by the developer in the expectation of receiving 39,015 square feet of "bonus" building area allowance under the provisions of the City Planning and Building Code. City approval of this bonus is uncertain due to microclimate and configuration constraints on its public use.

If the office tower were reconfigured to incorporate the small rectangle of site behind the French Bank, possibly as an off-set service core, an increase in construction unit cost would result. The proposed tower is now a simple rectangle and the added element would result in an "L" shape. The developer states that introduction of an irregular shape would increase construction unit costs 20 to 25% in comparison to a basic rectangle. In addition, an off-set core would decrease floor utilization efficiency for small tenants, the developer's proposed market.

Design alternatives for the proposed plaza are discussed on page 99 as mitigating measures. However, it is physically possible to shift the ground floor location of retail spaces and open spaces to allow increased open space along Montgomery and Bush streets under the tower. This would improve light, wind protection, and access conditions, but at possibly increased construction cost and decreased retail marketability for the developer. Such a shift may not qualify for the amount of bonus allowance anticipated by the developer from his proposed design; it may also have negative economic ramifications for the development.

A shorter building (of the same typical floor area but with fewer office floors) than proposed would tend to reduce impacts such as transportation, related air quality, land use/economic, public services, and energy on an approximately proportional basis. It would also increase unit costs of the proposed project and reduce the total revenues generated for a net decrease in rate of economic return for the developer.

The City Planning Department has indicated it may be visually desirable to build to the maximum height permitted by the zoning, thereby doing as much as possible to create the visual aspect of a "hill" of office buildings in the downtown area as discussed on page 59. A 500-ft. high building of the same total area as now allowed by the zoning (more floors but with less area on each typical floor) would not reduce the service core requirement on a typical floor (the core may increase to accommodate an additional elevator), but the floor would lose rental office area. The result would be a net reduction in rental office space and revenue of roughly 20% without any

change to the gross space of the building or its construction cost (construction cost may actually increase). In addition, the individual office dimensions and area would be reduced below what the developer believes is responsive to market demand.

Occupancy and impacts related directly to occupancy (transportation, related air quality, economic, public services, etc.) would tend to be reduced proportionate to the decrease in rentable floor area, 20%. Wind forces at street level would tend to be increased roughly proportional to the increase in height (22%). Energy consumption would increase somewhat for the higher lifts involved, but the increased skin area is not expected by the design engineers to materially affect fuel consumption (because of San Francisco's temperate climate).

Preservation of the facade of the E.F. Hutton Building in the new building, in order that the imagery and psychological response to the familiar neoclassic building would be preserved, is possible but would require extensive reconstruction (removal and replacement). This would be costly, and opportunities for either widening the sidewalks or having a sidewalk arcade would be lost. In addition, the scale and imagery of the old facade could be affected by incorporation into a 29-story building.

D. NO-PROJECT ALTERNATIVES

If the proposed project were not undertaken, the property would remain on the market for use in another project. Market demand for new office space in this area is such that it cannot be expected that the site would remain with the present buildings and uses for any extended period without formal City intervention and constraint. Further, it can be expected that the increment of office space demand that this project is intended to satisfy would be responded to by another building proposal in the same general area if this project were not implemented.

A future project would tend to develop to the maximum allowed by code, as does this project, and for similar occupancies. Impacts resulting from such future development would be similar to those of the proposed project, except to the extent that the delay may result in changes in construction cost, zoning, energy conservation capabilities,or other factors that affect impacts. Thus, the net impact resulting from "no project" would be a delay in occurrence of development and of the impacts resulting from development.

If no action were taken and the present structures did remain for an extended period of time, the City would require investigation of and strengthening or removal of the parapets, cornices, and related projections on the buildings to bring them into conformity with the parapet code (see page 36). If these decorative elements were removed, this could result in loss of some of the neoclassic character of the E.F. Hutton Building. The structure of the existing building is not designed in accordance with the current code requirements for earthquakes and extensive strengthening of the building would be necessary to bring it up to code if any major renovation were attempted. Even if this were done, the resistive capacity of the building would be only one-tenth of that recommended by Geotechnical Consultants to the developer's consulting engineers.[1]

The three buildings are unoccupied, but it is expected that new tenants would be found, particularly if the facilities were remodeled. The number of occupants of the three structures would be approximately 410 or roughly

---

1. Ruthroff & Englekirk Consulting Structural Engineers, Inc., Letter of June 11, 1976, to Gerald D. Hines Interests.

17% of the occupancy of the proposed project. Effects on transportation and circulation would be proportionately less.

VIII. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The project would commit the site to the proposed uses for at least several decades and thus limit its use for other purposes which might in the future be deemed desirable. The location of the proposed site is in an already developed area where commercial buildings make up the majority of land uses. The zoning of this area for high-rise development and, in turn, the assessment of the land for this type of development leave no reason to believe that there would be any change in land uses in the next several decades. It is likely that the use of the proposed site for high-rise development would eventually occur if this proposed project were not implemented. The immediate construction of the proposed building would ease the present tight supply of office space.

IX. ANY IRREVERSIBLE CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Construction of the proposed building would expend unrenewable material and energy resources. Subsequent operation of the building would continue to expend these resources. The construction of the proposed building on the site would commit the site to this particular building for at least several decades.

The site is in an active seismic area with a potential for liquefaction. Even if a building is designed to minimize the impetus of an earthquake, a possibility exists that the building would be affected in such a manner that there would be falling objects, glass, etc., from the building which could harm persons near it. In this sense the proposed building could pose a long-term risk to health and safety. The proposed building replaces existing structures having facade elements the City has declared to be potential hazards in an earthquake.

X. THE GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

The proposed project is one element of a general pattern of high-rise office development in the downtown area, a trend that has been under way for 20 years. This growth has been in response to increased demand for office space located in the finance and administrative district of San Francisco. This demand exists whether or not this proposed project is built.

The tenants of the proposed building would probably be mostly existing firms which relocate from other buildings (with or without expanding in the process) rather than firms new to the area, but the effect for the area would tend to be an equivalent net increase of jobs and employees. Economic acitivity and employment, and demand for services and housing in San Francisco and surrounding communities, would tend to expand by this amount plus that stimulated in associated service categories.

XI. ENVIRONMENTAL IMPACT REPORT AUTHORS AND PERSONS CONTACTED

EIR AUTHORS

San Francisco Department of City Planning
100 Larkin Street
San Francisco, CA 94102
Coordinator: Ralph Gigliello
Environmental Review Officer: Dr. Selina Bendix

Arthur D. Little, Inc.
One Maritime Plaza
San Francisco, CA 94111
Coordinators: Donald P. Black, Larry R. Aull

Environmental Impact Planning Corp.
Microclimatic Evaluation
319 Eleventh Street
San Francisco, CA 94103
Coordinator: Donald Ballanti

Skidmore, Owings & Merrill
Architects-Engineers
Project Architects
One Maritime Plaza
San Francisco, CA 94111
Walter Costa, Partner

DEVELOPER

Corwin Booth and Michael T. Hall
610 Newport Center Drive
Newport Beach, CA 92660
Coordinator: Michael T. Hall

PERSONS CONTACTED

Organization	Person
Alameda - Contra Costa Transit District	Don Larsen Senior Planning Coordinator
Bay Area Air Pollution Control District	Paul Brand Information Officer Helene Kornblatt
Bay Area Rapid Transit District	Bill Hein Director of Planning Ward Belding Economic Analyst
The Foundation for San Francisco's Architectural Heritage	Robert Berner Urban Conservation Officer

Organization	Person
Golden Gate Bridge, Highway, and Transportation District	Jerome M. Kuykendall Assistant to General Manager for Planning and Research
Golden Gate Disposal Corp.	John Ferrando District Supervisor
Metropolitan Parking Corp.	Robert Baker Assistant Secretary
City of Mountain View Engineering Department	Richard Haughey Assistant City Engineer
Ruthroff & Englekirk Consulting Structural Engineers, Inc.	Robert E. Englekirk Vice President
San Francisco Department of City Planning Environmental Review Section Transportation Planning Section	Alec Bash Planner Ed Green Planner
San Francisco Department of Public Health	Robert MacDonough
San Francisco Department of Public Works Bureau of Engineering	Cormac Brady Mechanical Engineer
San Francisco Department of Public Works Bureau of Sanitary Engineering	Lou Vagadori Mervin Francies, Engineer Robert Cockburn
San Francisco Department of Public Works Bureau of Traffic Engineering	Peter Woo Assistant Traffic Engineer
San Francisco Fire Department Division of Planning and Research	Robert E. Rose Chief
San Francisco Landmarks Advisory Board	Ed Michael, Secretary
San Francisco Police Department Division of Planning and Research	Robert Bernardini
San Francisco Public Utilities Commission	James J. Finn Director of Transportation
Tentau & Associates, Realtors	Hart Tentau Frank Harlan

APPENDICES

APPENDIX A

BIBLIOGRAPHY

Arthur D. Little, Inc. Commercial and Industrial Activities in San Francisco: Present Characteristics and Future Trends. Report to San Francisco Department of City Planning, June 1975.

Bay Area Air Pollution Control District. Guidelines for Air Quality Impact Analysis, 1975.

________ Source Inventory of Air Pollutant Emissions in The San Francisco Bay Area, 1973.

Blume, John and Associates. San Francisco Seismic Investigation. Prepared for the San Francisco Department of City Planning, June 1974.

California Department of Natural Resources, Division of Mines and Geology. Urban Geology Master Plan for California. Open File Report 72-74, December 1971.

Canter, Donald. Skyscrapper Boom is Slowing Down, San Francisco Examiner business page, June 9, 1976.

Federal Highway Administration. Federal Highway Program Manual, Vol. 7, Chap. 7, Washington, D.C., May 14, 1976.

Fruin, John J. Pedestrian Planning and Design. Metropolitan Association of Urban Designers and Environmental Planners, Inc., 1971.

McGulien, Bill (Grubb and Ellis Commercial Brokerage Co.). Recent Trends in High Rise Office Space Construction and Absorption San Francisco Central Financial District, undated.

National Academy of Sciences-National Research Council. Division of Engineering and Industrial Research. Highway Research Board. Highway Capacity Manual (Special Report 87). Washington, D.C., 1965, Chapter 6.

San Francisco, City and County of. San Francisco Noise Abatement and Control Ordinance No. 274-72, Section 2907 Construction Equipment, December 4, 1972.

________ Department of City Planning. Commercial Trends: Report Containing Background Information for the Commerce and Industrial Element of the Comprehensive Plan of San Francisco, July 1975.

San Francisco. Community Safety Element: The Comprehensive Plan of San Francisco (A Proposal for Citizen Review), July 1974, page 43.

_________ Draft Environmental Impact Report, 595 Market Street, (E.E. 74. 322) December 1975.

_________ Final Environmental Impact Report, Bank of Tokyo of California Building (E.E. 74.170). February 27, 1975.

_________ Labor Force Trends: Report Containing Background Information for the Commerce and Industry Element of the San Francisco Comprehensive Plan, June 1975.

_________ Transportation Element of the San Francisco Master Plan, April 22, 1972.

_________ Police Department. Environmental Impact Report-Evaluation of Police Services for Arthur D. Little, Inc., July 1976.

San Francisco Planning and Urban Renewal Association. Impact of Intensive High Rise Development on San Francisco. San Francisco, 1975.

_________ Unpublished data developed for the study "Impact of Intensive High Rise Development on San Francisco," provided by Keyser-Marston and Associates of San Francisco, 1975.

Trask, P.D. and Rolsten, J.W., "Engineering Geology of San Francisco Bay." Geological Society of America Bulletin, V.62, No. 9, P. 1085, 1951.

APPENDIX B

TABLE 13

FLOOR AREA RATIO AND BONUS AREA CALCULATIONS

Floor Area Ratio (FAR) Calculations:

The site has a FAR of 14:1, therefore:

18,579 sq. ft. site area x 14 = 260,100 sq. ft. Allowable Floor Area

Bonus Calculations:

Building Feature	Unit of Feature of Which Bonus is Based and Number of Units	Sq. Ft. of Bonus Area per Unit of Feature	Number of Units of Feature	Square Feet of Bonus
Rapid Transit Proximity	Distance less than 750' from station	50	210'	10,500
Multiple Building Entry	Each major entrance after first	5% FAR	1	13,005
Sidewalk Widening	Each creditable foot sidewalk widening	7	4648	32,535
		3	2160	6,980
Shortened Walking Distance	Each foot by which walking distance between streets and alleys is shortened	40	36	1,440
Plaza	Each creditable sq. ft. of plaza area	15% FAR	5573	39,015
Side Setback	Each creditable sq. ft. of setback	6	3837	23,025
Total Bonus Allowance				126,000

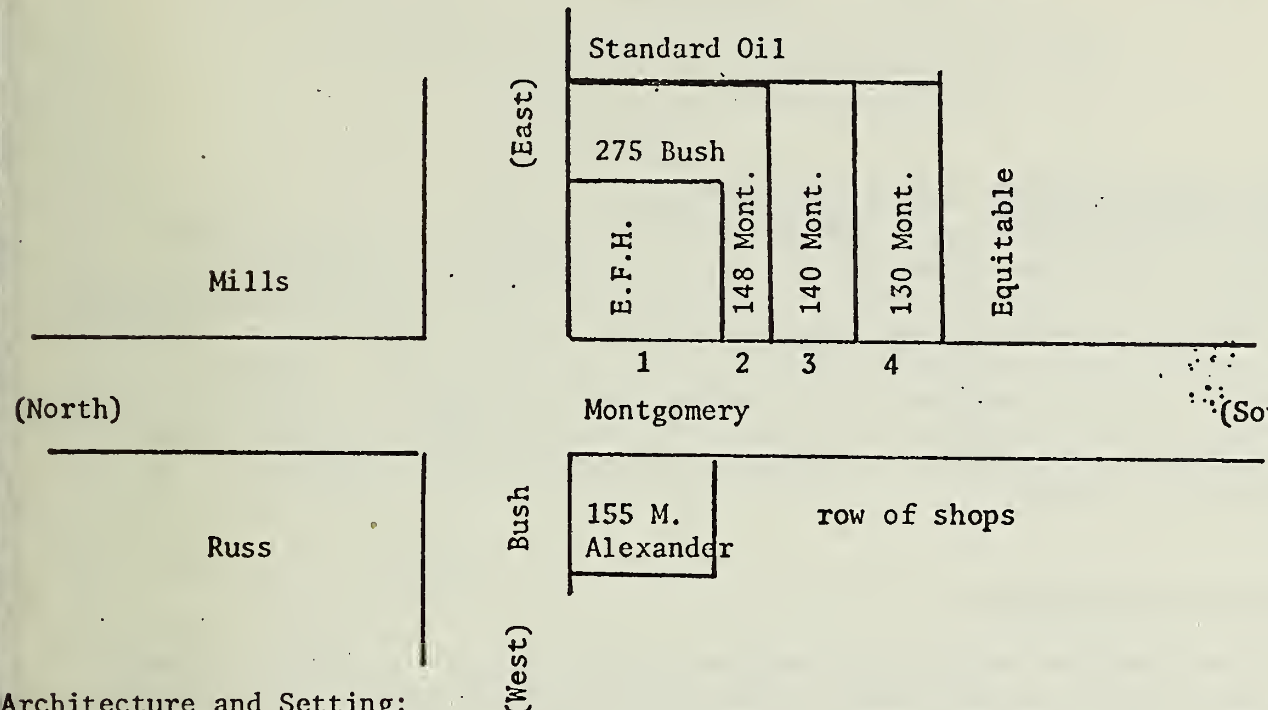
TOTAL FAR + BONUS ALLOWANCE: 386,100 sqare feet

*Approval of bonus for plaza is uncertain as of 30 March 1977 due to design and microclimate constraints to use.

APPENDIX C

PREPARED BY THE FOUNDATION FOR SAN FRANCISCO'S ARCHITECTURAL HERITAGE

Report on the Montgomery/Bush Intersection June 28, 1976



Architecture and Setting:

The most important architectural feature of this important intersection is the buff color of the brick and terra cotta clad Mills, Russ and Alexander Buildings. The Mills and Russ Buildings are premier landmarks in the Financial District. It is especially important that the venerable Mills Building not be overwhelmed by an unsympathetic neighbor. (This does not mean that a parody of the Mills is called for.)

Another very important neighbor is the old Standard Oil Building on Bush, a light gray, handsomely detailed office building.

The group of low buildings on the southeast corner of Montgomery and Bush is of uneven height and allows a good view of the Standard Oil Building from Montgomery. The group embodies the scale and styles of post-1906 Montgomery Street

1. 160 Montgomery (E.F. Hutton Building)
   This is a 4 story, white, neo-classical, cube-shaped reinforced concrete building typical of San Francisco's bank and brokerage buildings. The Montgomery Street elevation is distinguished by four, 2 story high engaged classical columns with three arches between them. The Bush Street elevation has five pillasters and four arches. The building is a very good example of low rise classical buildings of the type that once dominated Montgomery Street. An important building with high visibility.

2. 148 Montgomery/275 Bush (Title Insurance)
   This is a five story, red brick clad neo-Georgian building with white trim. A pair of white columns flank both the Montgomery and Bush Street entrances. This L-shaped building has five stories on Bush Street and what appears to be one story on Montgomery. Not a particularly handsome building.

3. 140 Montgomery (Gibraltar Savings)
   An indifferent building with a concrete grillework screen on its front.

4. 130 Montgomery (French Bank of California)
This is a narrow, six story stone faced (?) building in the art deco style. The building has fine ornamentation and a very nicely carried out design that works well with the buildings narrow shape. The entrance is dramatically treated and flanked by bas reliefs of muscular figures. The copper (bronze?) spandrels are very beautifully designed with zig zag motifs. Its color harmonizes with its neighbor to the south. There are very few buildings in this style in San Francisco, and this is one of the finest. An important architectural embellishment to downtown. Whatever is built next to it should try to respect it.

Urban Context and Street Life:

One of the most welcome features of Montgomery Street is the surprizing variety of shops and services on the sidewalk level of (especially) the older buildings. Bars, eating places, clothes stores and many other small businesses make the street a lively and rewarding place to walk. This is increasingly rare in American financial districts where bank branches and airline ticket offices have effectively sterilized such prime streets. The large new high rises that have appeared along Montgomery recently have tended to turn their expensive street levels over to bank branches and similar monotonous uses. This problem got so bad in mid-Manhattan that planning policies have had to be instituted to try to overcome it. San Francisco's Financial District has escaped this blight--so far. Across the street from the group of low buildings under examination is a particularly interesting row of shops anchored by the Magnin's at 155 Montgomery. A surprizing number of small stores survive here. This could be expanded across the street. The Equitable Building, with a bank on the corner, is a sufficient warning of what not to do.

Randolph Delehanty
June 28, 1976

APPENDIX D

TRANSPORTATION

TABLE 14

ON-STREET PARKING AND PARKING ZONE CONDITIONS
VICINITY OF BUSH AND MONTGOMERY

Street	Parking Meters Reg.	Parking Meters Yellow	Truck Loading Zones* (feet)	Special Truck Loading Zone* (feet)	White Zones* (feet)
N-North Side					
S-South Side					
California					
N-Grant-Kearny					
S- " "					
N-Kearny-Montgomery					
S- " "					
N-Montgomery-Sansome					
S- " "				177,110,18	43
N-Sansome-Battery					
S- " "	2	4	38	84	
Pine					
N-Grant-Kearny	12				
S- " "	7	2	57		
N-Kearny-Montgomery		2	66	44,109,53	
S- " "					
N-Montgomery-Sansome	2	6	60,30,44	48	
S- " "					
N-Sansome-Battery		7	49,30		
S- " "					
Bush					
N-Grant-Kearny	3	2	29,42,34		31
S- " "		7	30,30,38,35		
N-Kearny-Montgomery					
S- " "		7	22	28,21	30
N-Mongomery-Sansome					
S- " "		2	23,41,38		36
N-Sansome-Battery					22
S- " "		2	66,62		44
Sutter					
N-Grant-Kearny	1	5	44		22
S " "	2	2	114,72		
N-Kearny-Mongomery		4	42,36		
S " "		5	56,54,20,22		44,22
N-Montgomery-Sansome		3		62	
S- " "		6	37,43,42	110	

TABLE 14 (continued)

ON-STREET PARKING AND PARKING ZONE CONDITIONS
VICINITY OF BUSH AND MONTGOMERY

	Parking Meters Reg.	Parking Meters Yellow	Truck Loading Zones* (feet)	Special Truck Loading Zone* (feet)	White Zones* (feet)
Post					
N-Grant-Kearny	6	3	40		
S- " "	4	5	38,40		
N-Kearny-Montgomery		10	22	110	
S- " "	1		40	60,44	26,47
Geary					
N-Grant-Kearny	3	4	42		
S- " "	4	3	22,75		
Grant					
W-California-Pine					
E- " "					
W-Pine-Bush					
E- " "					
W-Bush-Sutter					
E-Bush-Sutter	3		20,28		64
W-Sutter-Post					
E-Sutter-Post			38-60		22
W-Post-Geary					
E- " "	1	2	51		40
W-Geary-Market					
E- " "	5			88	44
Kearny					
W-California-Pine	5			40	41
E- " "					
W-Pine-Bush		2	110	88	
E- " "					
W-Bush-Sutter		5	75		
E- " "					
W-Sutter-Post		5	18,33	76	
E- " "					
W-Post-Geary				88,88	
E- " "					

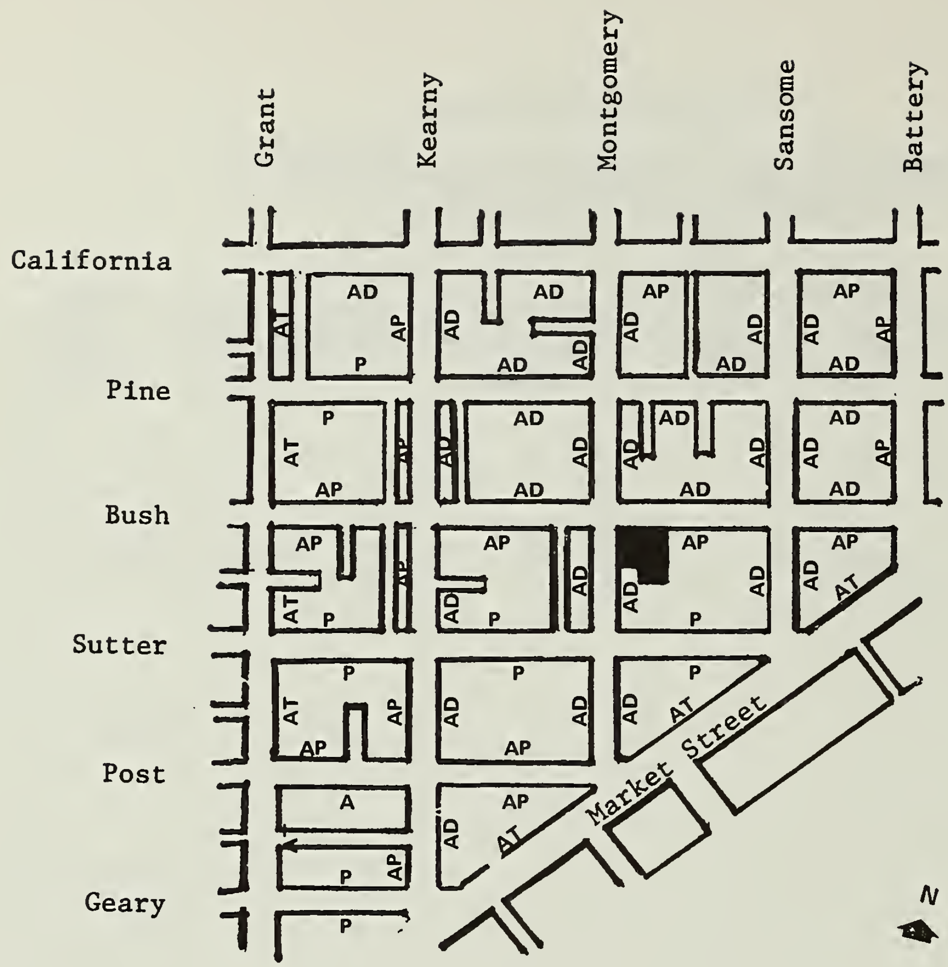
TABLE 14 (continued)

ON-STREET PARKING AND PARKING ZONE CONDITIONS
VICINITY OF BUSH AND MONTGOMERY

	Parking Meters				
	Reg.	Yellow	Truck Loading Zones* (feet)	Special Truck Loading Zone* (feet)	White Zones* (feet)
Montgomery					
W-California-Pine					
E- " "					
W-Pine-Bush					
E- " "					
W-Bush-Sutter					
E " "					
W-Sutter-Post					
E " "					
Sansome					
W-California-Pine					
E- " "					
W-Pine-Bush					
E- " "					
W-Bush-Sutter					
E- " "					
Battery					
W-California-Pine		2	41,40		
E- " "					
W-Pine-Bush			66,77		
E- " "					
W-Bush-Market					
E- " "					
Total	61	107	2,422	1,546	578

Source: City and County of San Francisco, Bureau of Traffic Engineering, Parking Meter District Maps.

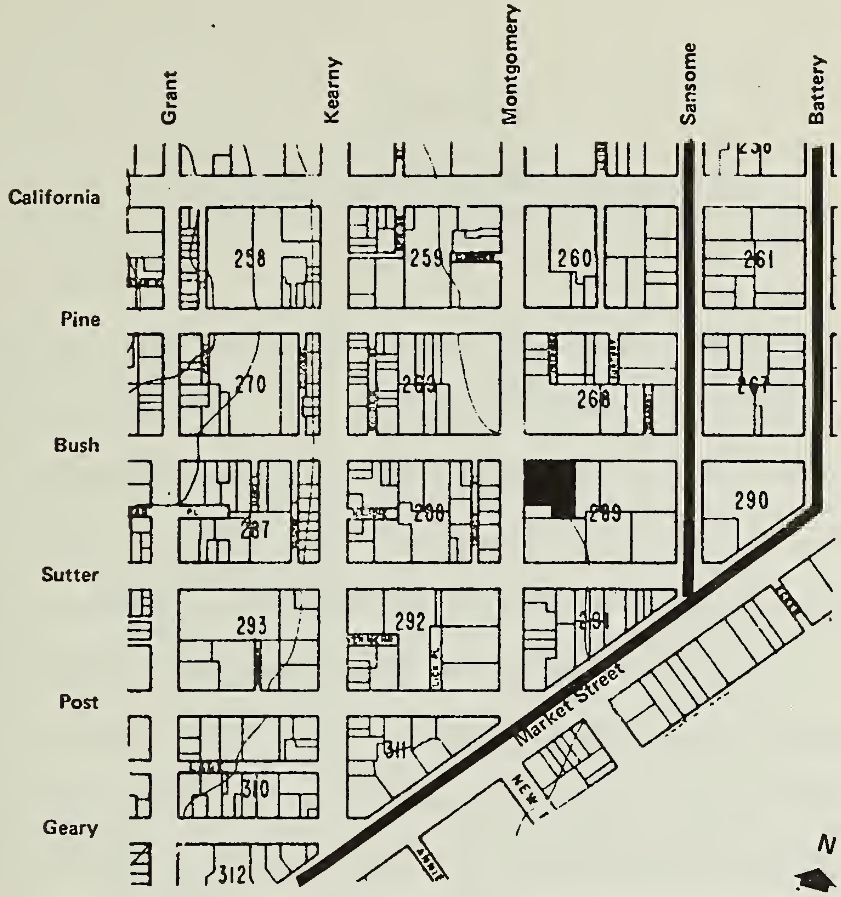
* Each number corresponds to a separate zone. (i.e., 177, 110, 18 = one zone of 177', one zone of 110', and one of 18'.)



Code	Time	Days
A	7-9 a.m.	Monday-Saturday
P	4-6 p.m.	Monday-Saturday
AP	7-9 a.m. and 4-6 p.m.	Monday-Saturday
AD	7 a.m.-6 p.m.	Monday-Friday
AT	All Times	Every Day

Source: Bureau of Traffic Engineering, City and County of San Francisco.

FIGURE 21 TOW-AWAY ZONES IN THE VICINITY OF MONTGOMERY AND BUSH



Source: San Francisco Master Plan, Transportation Element, adopted April 27, 1972.

FIGURE 22 STREETS DESIGNATED AS BICYCLE ROUTES

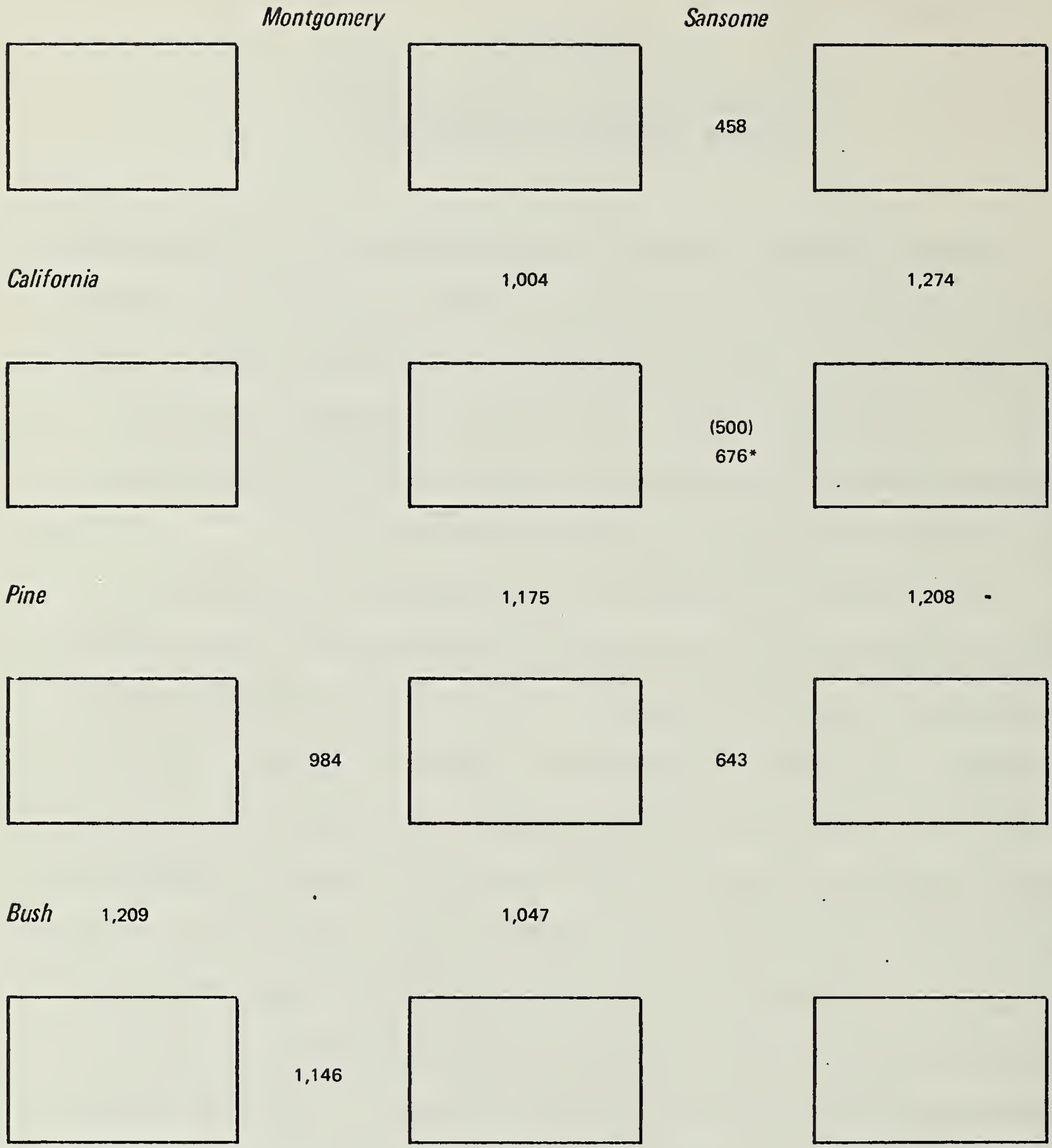
APPENDIX E

AIR QUALITY CALCULATIONS FOR EXISTING CARBON MONOXIDE CONCENTRATIONS

Emissions estimates require three fundamental types of information: the size and character of the vehicular source, the emissions rate of individual vehicles, and the meteorologic process which results in dispersion of emissions away from their point of generation. The data sources and assumptions required to complete the emissions estimates for this study are outlined in the following discussion.

Source strength and character are established by the number of vehicles passing through the air cell in question and by their mode of operation for peak hour calculations. The volume of rush hour traffic on various city streets is measured as a number of vehicles per hour. By comparison to the theoretical capacity of the roadway, the volume of traffic determines the service level or degree of congestion experience. Actual traffic experience varies from day to day, yet the peak hour count is a generally reliable indication of the vehicular volume. The actual congestion, however, is more variable, depending largely upon weather conditions and upon the flow of traffic at origin or destination points fairly distant from the street segment under discussion. The peak hour vehicular loads used in the calculation are shown in Figure 23.

Traffic volume alone does not determine source of strength. The operating mode determines the amount of time the vehicles spend within a specific stretch of roadway, and the engine cycle characteristics that will affect individual vehicle emissions.



*Counts taken at different intersections on different days provide conflicting data. The higher figure was assumed in the calculations.

<u>Source</u>: San Francisco Department of Public Works (Pine-Sansome Intersection)
Arthur D. Little, Inc., (Bush-Montgomery Intersection).

FIGURE 23 PEAK HOUR VEHICLE COUNTS

The operating mode was assumed in the worst case to be an average route speed of five miles per hour, comprising equal periods of idling and travel at 10 miles per hour which reflect the signalization at all intersections. Minor variations between intersections in signal cycle produce minor changes in emissions calculations which are probably not significant given the overall level of accuracy of this method. Even more significant than the cycle itself is the phasing of successive traffic signals on major traffic flow patterns. The traffic signalization for these calculations was assumed to be 30 seconds stop, 30 seconds go. The worst case assumption leads to an average forward progression between traffic signal intervals of 450 feet--roughly the length of one city block. A more typical operating mode assumes an average route speed of 10 miles per hour, comprising roughly equal periods of idling and traveling at 20 miles per hour. This rate of progression implies that the motorist would transit two to three city blocks on a signal interval if the lights are properly phased.

Vehicular emissions are a complex function of the internal combustion engine technology of various model years combined with deterioration and modified by differences in the operating characteristics of the engine under varying speeds and loads and temperatures. Practically speaking, emissions measurements from actual vehicles based upon laboratory tests simulating steady state travel have been most consistent. At very low speeds, particularly in stop and go traffic, there is more variation between observations of vehicular emissions for nearly all pollutants. Earlier (1973), measurements combined with estimates of emissions control technology for the future implied a dramatic drop in emissions levels for all pollutants in nearly all modes of engine operation. More recently,

the large emissions during idle, particularly of cold engines, have received new emphasis. In addition, many putative technological innovations have been delayed indeterminantly. As a result, auto emissions modeling the low route speed situation at issue here will vary depending on the experimental data base and the calendar year of emissions forecast. The current U. S. Environmental Protection Agency approach has been to stress the empirical nature of auto emissions based on the actual driving cycle observed. Data in the most recent supplment to the publication AP-42[1] focuses on empirical measurement and emphasizes the errors of projection, presenting empirical data for calendar years 1972 and earlier. In some instances, the carbon monoxide empirical emissions level data for low route speed is 4 times greater than earlier projected emissions levels for the same year. Analysis for this study was therefore made on the basis of both EPA 1972 rates and Bay Area Air Pollution Control District (BAAPCD) projected rates.[2]

In the analysis of emissions levels for this pollutant, the individual vehicular emissions levels of both methods are presented for comparison. The actual pollutant concentrations will resemble those calculated with the 1980 year projection as a base to the degree to which new technological improvements in emissions controls become available and are in fact effective in this range of the internal combustion engine cycle. If technological controls are relatively ineffective or substantially delayed, then the pollutant experience may more closely resemble the levels calculated with the 1972 vehicle as a base.

---

1. U. S. Environmental Protection Agency, Office of Air and Waste Management/Office of Air Quality Planning and Standards, Supplement No. 5 for Compilation of Air Pollutant Emission Factors, Second Edition, Supplement to AP-42, December 1975.

2. Bay Area Air Pollution Control District, Guidelines for Air Quality Impact Analysis of Projects, June 1975.

The meteorology of pollutant dispersion in cities is complex and relatively little understood by comparison with the mesoscale analysis for vehicular sources in relatively open country. The most obvious urban component -- large buildings and canyon-like streets -- complicate the airflow patterns. The high surface roughness of the urban environment drastically reduces the average wind speed and the mass of air movement at ground level from that which would be experienced in open country, yet the same surface roughness with a highly geometric arrangement of streets results in a large degree of turbulence and vertical mixing of the air mass as well as in amplification of actual air velocities at ground level at certain points.

Two fundamental airflow patterns are at issue. In one pattern, the predominant regional airflow is parallel to the street section under study. In this case, the velocity at street level is usually very close to, and on occasion even in excess of, the nominal wind velocity in open terrain. Pollutants generated within an air cell are carried along the canyon formed by the street cross section without substantial mixing to either side and with only vertical turbulence and dispersion as the factor controlling steady state pollutant concentrations. The opening of streets at every intersection induces substantial turbulence and air exchange. For the purposes of the analysis used in this study, the canyon effect was assumed to be dominant for the length of two city blocks; that is, that over a two-block period or distance very little transverse air mixing would occur and at the end of the two blocks nearly complete transverse air mixing would occur. This limits the amount of polluted air imported into the cell that serves as a background for emissions from those vehicles that actually occupy the cell under study.

When the predominant airflow is perpendicular to the street, the wind velocity at ground level is dramatically attenuated. In this study, a value of 50 percent is assumed, which may be high in absolute value but which in some degree takes into account the increased vertical mixing caused by cross turbulence at roof top and intersection.

Because of the nature of the parallel airflow and pollutant importation, that situation represents the greatest potential for concentration of pollutants. This cannot be construed as a worst case, however, because nearly every airflow pattern will result in parallel airflow on at least some city streets due to the rigid geometricity of urban planning in the past. Vertical dispersion in the parallel airflow situation is difficult to estimate in the urban case. In the open, with studies of depressed highway sections, the vertical mixing resulting from thermal air currents has been found to play a significant role.

The degree of thermal mixing is indicated by air stability classes, designated by the letters A through F or occasionally beyond. The proximate letters represent unstable air conditions where warm surface air will rise continuously and induce substantial vertical mixing. The distal letters (E or F) indicate stable thermal air regimes, which result in very little mixing and produce the inversion layer phenomenon. Although this effect of air stability undoubtedly acts in urban environments, it is quite likely that the high surface roughness and urban heat island effect will largely offset this phenomenon. Furthermore, the difference in equations represented by the typical and worst case stability classes is relatively small, approximately 10 percent, such that it appears not to be a dominant

environmental parameter. Nonetheless, the worst case is assumed to be air stability Class F, while the typical case for the Bay Area is stability Class D.

Comparing airflow patterns parallel and perpendicular to the street system, there is approximately a threefold difference in ground level concentration. Parallel airflow represents the worst case even though wind velocity attenuation is assumed to be 50 percent for the perpendicular airflow. Airflow patterns that produce winds roughly at 45^{o} angles to the street grid produce results roughly intermediate between the two extreme cases.

Since it is problematic as to the actual direction of airflow in combination with other environmental conditions that constitute the typical case, the presentation of ground cell concentration is given as a range. The higher figure represents an instance where the wind would be parallel to the street under designation and the lower figure represents the situation where the predominant airflow is perpendicular to the street under study. Since there is a statistically significant preponderance of westerly wind patterns, it is most likely that east-west streets would experience the higher concentrations while north-south streets would receive the benefits of vertical air mixing induced by perpendicular airflow. This tendency has not been included on a statistical basis within the calculations presented here.

The results of calculations based on the preceding assumptions are presented on a series of street maps, Figures 24 through 27. By comparison with the state and federal ambient air quality standards for one-hour averaging times of carbon monoxide exposure, it may be seen that several

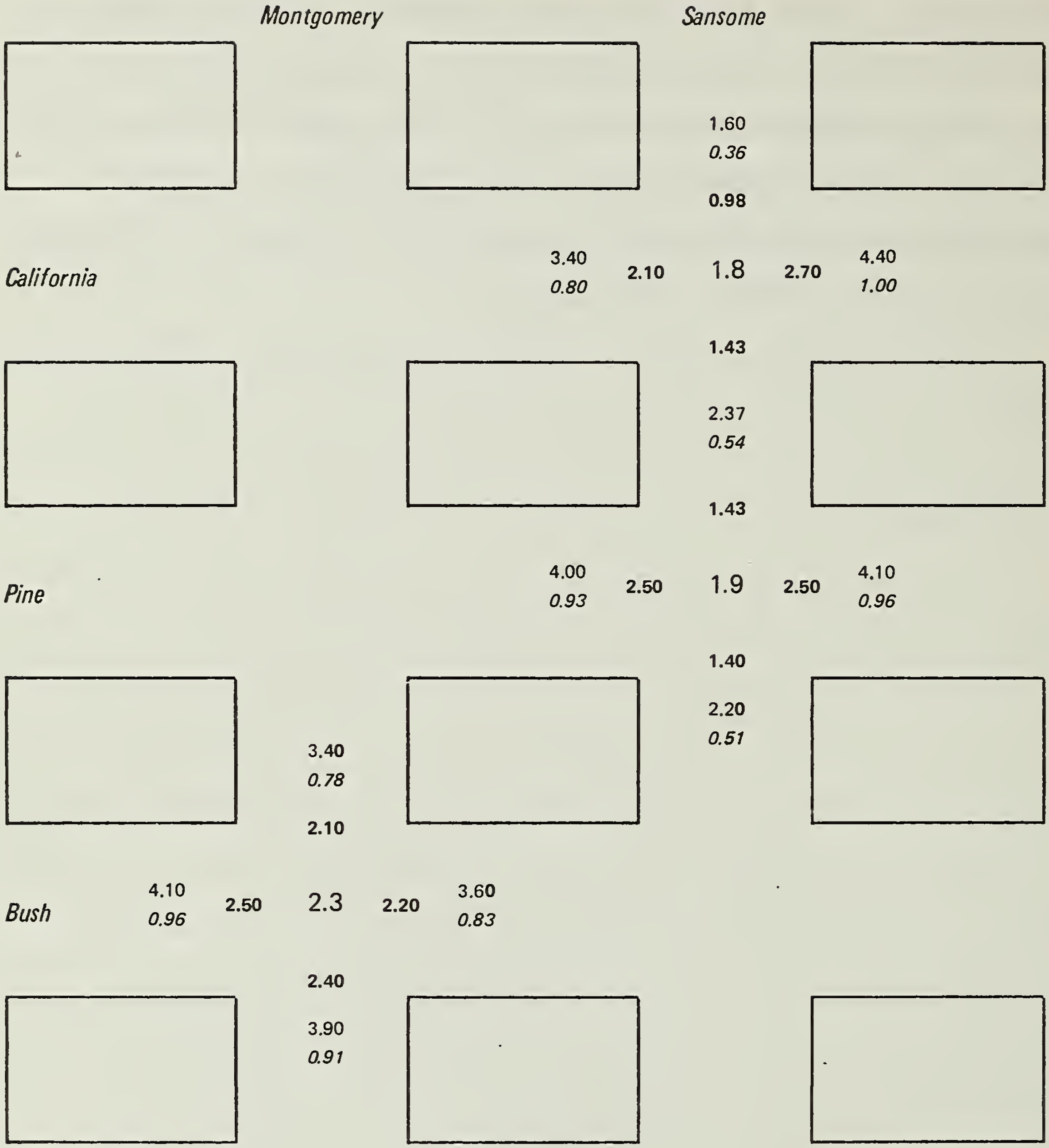
street segments produce unacceptable levels of carbon monoxide with parallel wind flows in the worst case condition, assuming that emission levels for individual vehicles follow the empirical data recently presented by the EPA. Conversely, consideration of emissions projections based on 1980 technological improvements results in far lower carbon monoxide levels and no violation of the ambient air quality standards for this pollutant over a one-hour period.

The complexity of the urban situation combined with the necessarily elaborate algebraic combination of rather variable parameters leads to a substantial degree of variance in the estimates of actual carbon monoxide experience. Actual carbon monoxide levels under most circumstances are expected to be lower due to the greater role of turbulence induced by surface roughness than has been taken into account in the model used. There are, however, meteorologic conditions which closely mimic the worse case such that it does represent a realistic albeit conservative estimate of pollutant conditions that may be experienced on the order of several days per year.

Vehicular pollutants are emitted approximately one foot from the ground by the tailpipes of the individual vehicles. Normally, due to the motion of the vehicles themselves, exhaust gasses are rapidly mixed in a cell approximately twice the height of the vehicles and extending approximately one vehicle lane width on either side of the actual traffic area. This zone constitutes "the ground mixing cell" and represents the volume of air into which the vehicular emissions are immediately diluted and which will then be subject to subsequent dispersion by meteorologic factors. In the urban situation the mixing cell is not strictly comparable to that of the open terrain. First of all, the route speed is so low that turbulence and rapid mixings are problematic in

many instances. On the other hand, the street width is roughly that defined under normal vehicular emissions theory and the averaging time of one hour for carbon monoxide standards integrates over the large degree of variation that will occur during intervals of traffic signalization when a corridor of idling vehicles produce pollutants that receive little dispersion within the mixing cell until vehicular motion resumes.

The basic equations, factors, and emissions rates used in this analysis follow:



Key:

The numbers represent one-hour average carbon monoxide concentrations in milligrams per cubic meter:

With the wind parallel to the street

With the wind perpendicular to the street

For each street, average of the parallel and perpendicular winds

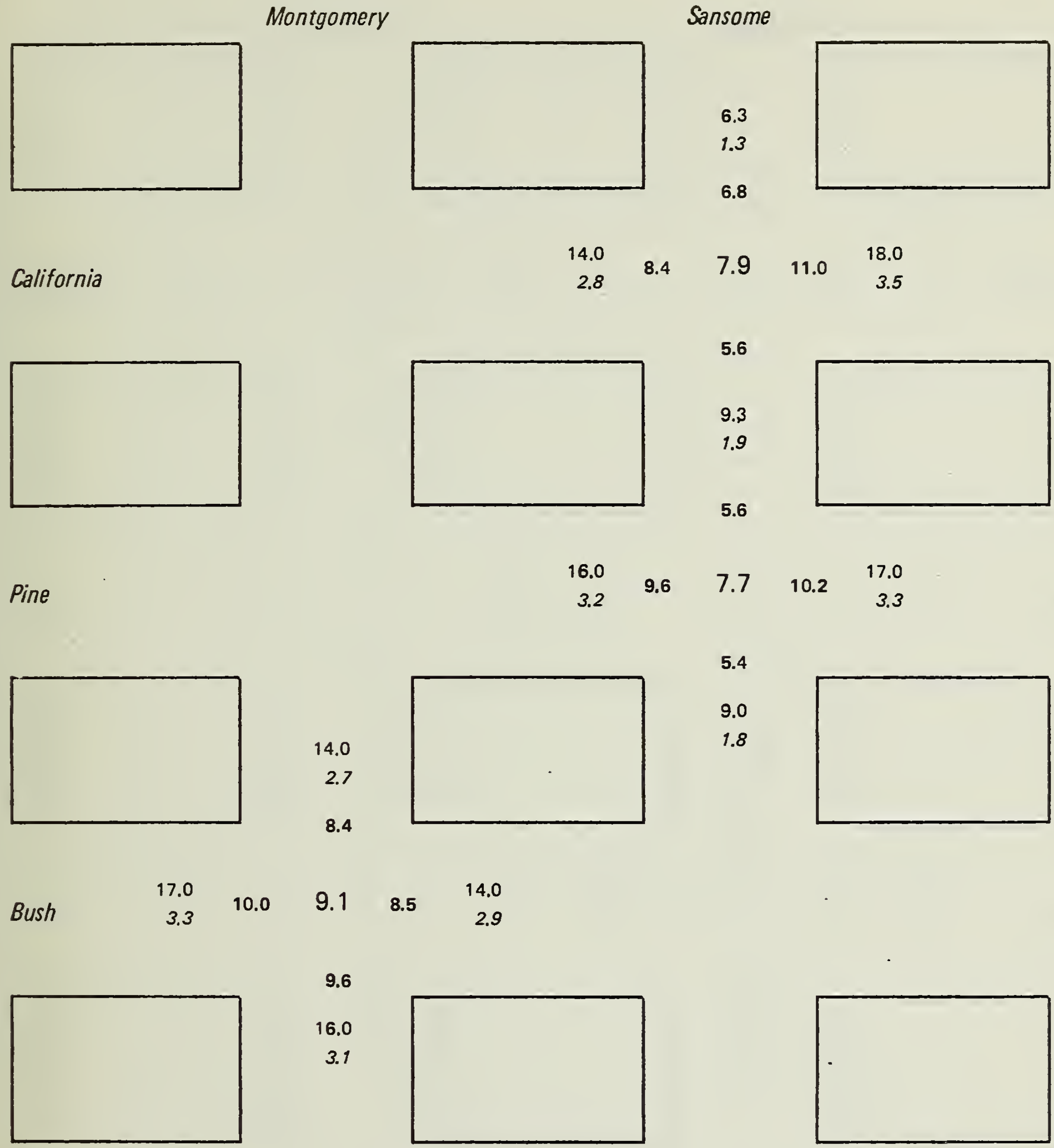
For the intersection, average of the four street segments

Note: CO emissions rate: 36.0 g/mi
M Factor: {Perpendicular 0.022 ←→ Parallel 0.095}

*Ambient Air Quality Standards for maximum one-hour concentration of carbon monoxide:

Federal — 40 mg/m^3 (35 ppm)
California — 46 mg/m^3 (40 ppm)

FIGURE 24 CARBON MONOXIDE CONCENTRATIONS ASSUMING BAAPCD 1980 EMISSIONS FACTORS AND TYPICAL CASE AIR STABILITY CONDITIONS



Key:

The numbers represent one-hour average carbon monoxide concentrations in milligrams per cubic meter:

With the wind parallel to the street

With the wind perpendicular to the street

For each street, average of the parallel and perpendicular winds

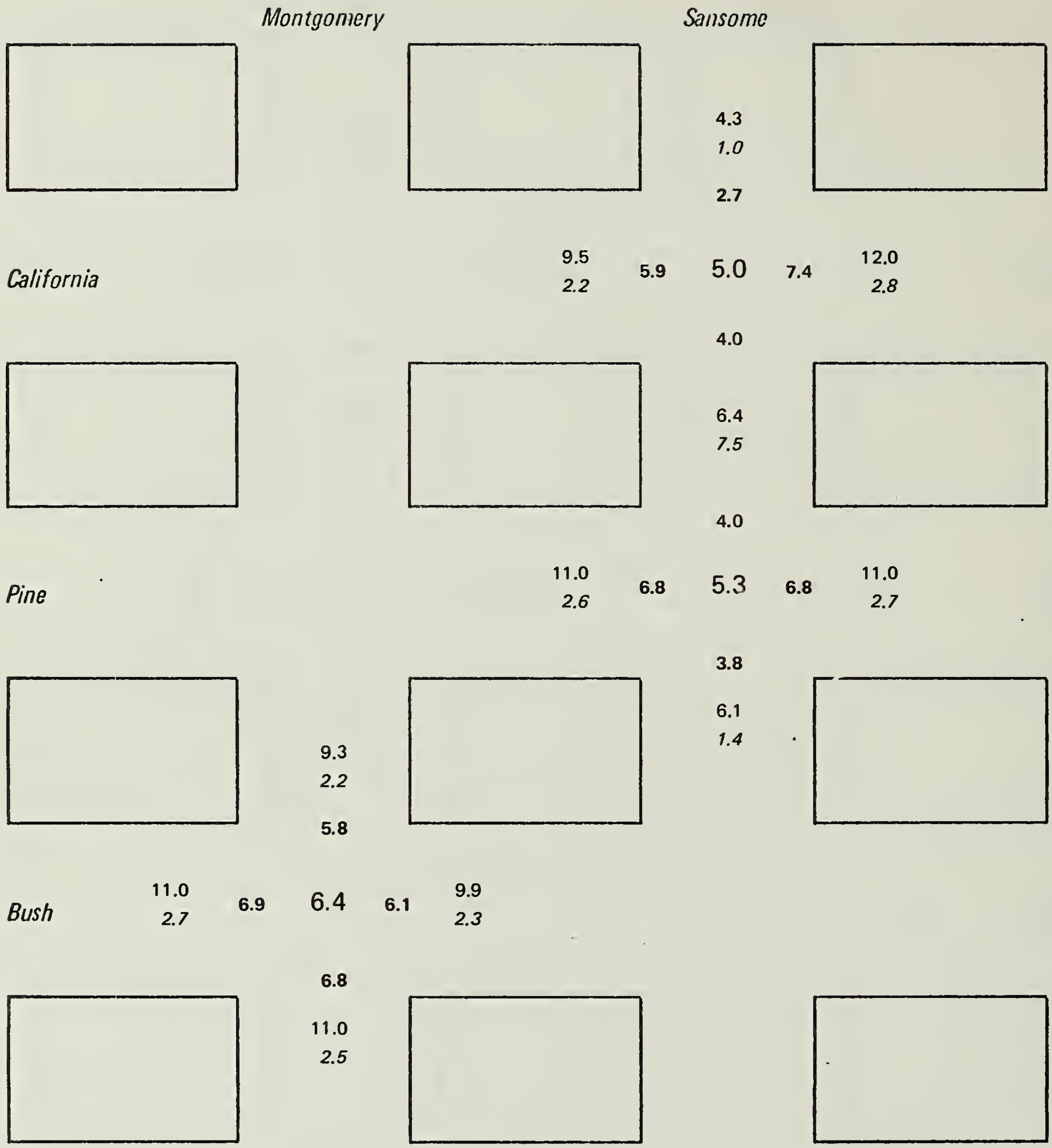
For the intersection, average of the four street segments

Note: CO emissions rate: 63.6 g/mi
M Factor: {Perpendicular 0.043 ↔ Parallel 0.216}

*Ambient Air Quality Standards for maximum one-hour concentration of carbon monoxide:

Federal — 40 mg/m^3 (35 ppm)
California — 46 mg/m^3 (40 ppm)

FIGURE 25 CARBON MONOXIDE CONCENTRATIONS ASSUMING BAAPCD 1980 EMISSIONS FACTORS AND WORST CASE AIR STABILITY CONDITIONS



Key:

The numbers represent one-hour average carbon monoxide concentrations in milligrams per cubic meter:

With the wind parallel to the street

With the wind perpendicular to the street

For each street, average of the parallel and perpendicular winds

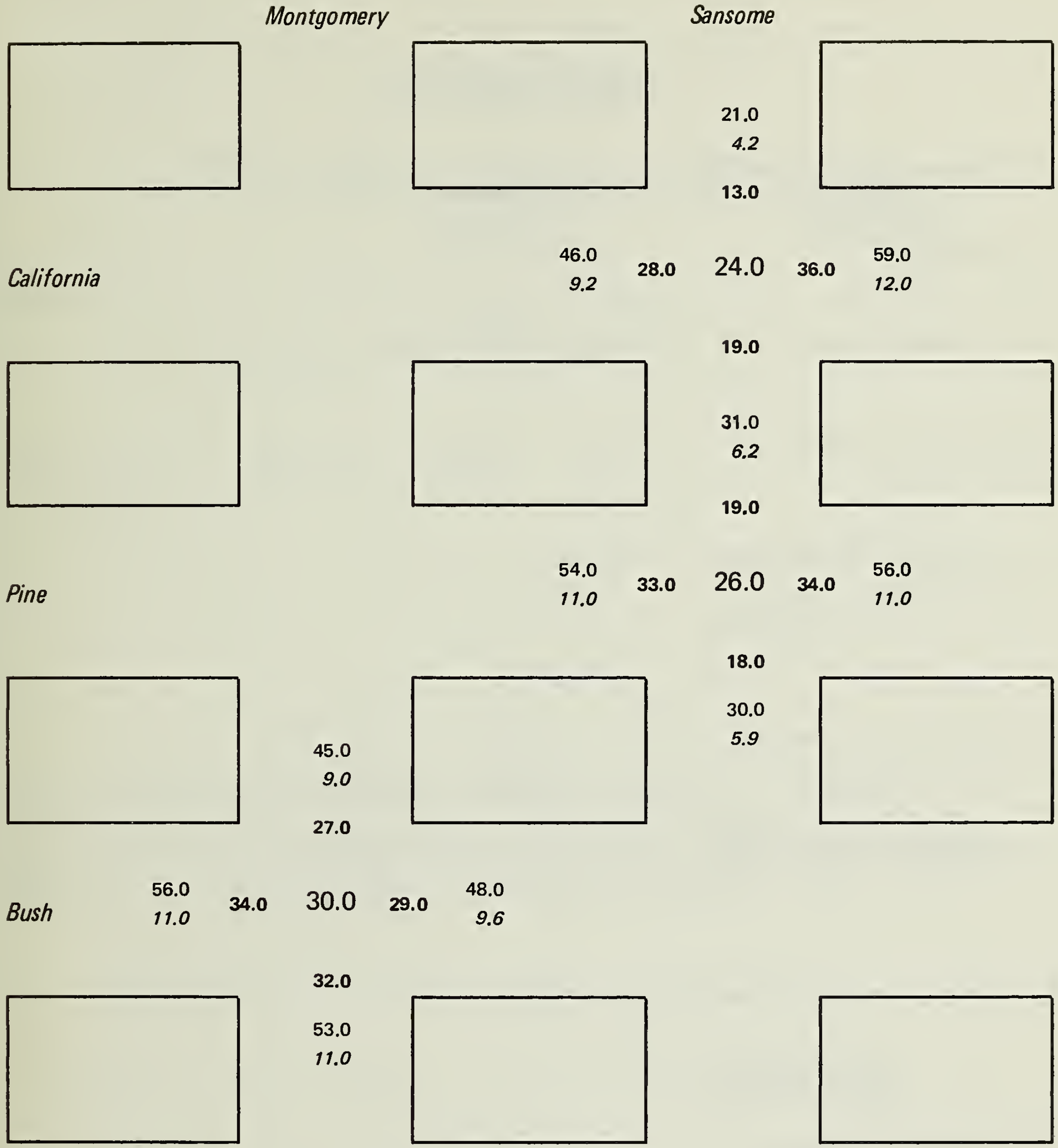
For the intersection, average of the four street segments

Note: CO emissions rate: 213.6 g/mi
M Factor: {Perpendicular 0.022 ⟷ Parallel 0.095}

*Ambient Air Quality Standards for maximum one-hour concentration of carbon monoxide:

Federal — 40 mg/m^3 (35 ppm)
California — 46 mg/m^3 (40 ppm)

FIGURE 26 CARBON MONOXIDE CONCENTRATIONS ASSUMING EPA 1972 EMISSIONS FACTORS AND TYPICAL CASE AIR STABILITY CONDITIONS



Key:

The numbers represent one-hour average carbon monoxide concentrations in milligrams per cubic meter:

With the wind parallel to the street

With the wind perpendicular to the street

For each street, average of the parallel and perpendicular winds

For the intersection, average of the four street segments

Note: CO emissions rate: 213.6 g/mi
Factor M: Perpendicular 0.043 ↔ Parallel 0.216

*Ambient Air Quality Standards for maximum one-hour concentration of carbon monoxide:

Federal — 40 mg/m^3 (35 ppm)
California — 46 mg/m^3 (40 ppm)

FIGURE 27 CARBON MONOXIDE CONCENTRATIONS ASSUMING EPA 1972 EMISSIONS FACTORS AND WORST CASE AIR STABILITY CONDITIONS

BASIC EQUATIONS

CO concentration (mg/m3) = vehicles/hr. x g/mi. x M'
with wind parallel (//) or perpendicular ($\perp$) to street

Orientation:

Meteorologic Factor $M_{\perp} = c/Q = \dfrac{1.06}{K R \bar{U} \sin\phi}$ perpendicular

Meteorologic Factor $M_{//} = c/Q = \dfrac{AW'}{RUK}$ parallel

A	downwind concentration	@ 1000'	
	air stability class F	0.24	
	" " " D	0.21	
$\bar{U}$	average wind speed	2 m/s	worse case
		4 m/s	typical case
R	roughness attenuation	1.0	parallel
		0.5	perpendicular
$\frac{W'}{K}$	width correction (empirical)	0.34	
	$\dfrac{7.19}{\text{width (meters)}}$		street is 70' or 21 m
K	empirical constant	4.24	
ϕ	angle of wind	$\perp$ use 90^{o}	

METEOROLOGIC FACTOR

		M' Using g/mi.	Modified M' Using mg/m^3
Worse Case	$M_{//}$	= 0.041	0.216
	$M_{\perp}$	= 0.250	0.043
Typical Case	$M_{//}$	= 0.018	0.095
	$M_{\perp}$	= 0.125	0.022

Empirical factor for conversion of g/mi. to mg/m3, in accordance with State of California Business and Transportation Agency, Department of Public Works, Division of Highways, Air Quality Manual, Mathematical Approach to Estimating Highway Impact on Air Quality, July, 1972.

For parallel winds = 5.26
For perpendicular winds = 0.173

CARBON MONOXIDE EMISSION FACTORS
(grams/mile)

As defined by: Bay Area Air Pollution Control District, Guidelines for Air Quality Impact Analysis of Projects, June, 1975.

1980 CO (Table 1)	16.8 g/mi. @ 20 mph 5.6 g/min.			
10 mph route speed correction 1.5				25.20 g/mi. 4.2 g/min.
Motor idling 6.4 g/min. (Table 2)				
Composite	30/30	@ 5 mph avg.	worse	5.3 g/min. 63.6 g/mi.
"	"	@ 10 mph avg.	typical	6.0 g/min. 36.0 g/mi.

As defined by: U.S. Environmental Protection Agency, Office of Air and Waste Management/Office of Air Quality Planning and Standards, Supplement No. 5 for Compilation of Air Pollutant Emission Factors, Second Edition, Supplement to AP-42, December, 1975.

1972 CO	59.7 g/mi.	@ 20 mph		19.9 g/mi.
	133.1 g/mi.	@ 10 "		22.2 g/min.
	247.8 g/mi.	@ 5 "		20.6 g/min.
Motor idling 13.3 g/min.				
Composite	30/30	@ 5 mph avg.	worse	17.8 g/min. 213.6 g/mi.
"	"	@ 10 mph avg.	typical	16.6 g/min. 99.6 g/mi.

APPENDIX F

MICROCLIMATE IMPACT ANALYSIS FOR THE PROPOSED MONTGOMERY-BUSH HIGH-RISE BUILDING

Environmental Impact Planning Corporation
319 11th Street, San Francisco, CA 94103

I. INTRODUCTION

Architects, engineers, and city planners designing urban structures are limited by lack of information on wind effects brought on by the presence of these structures, such as discomfort for pedestrians and wind-caused mechanical problems with doors, windows, and ventilating systems. Once a structure is built, remedial measures (if they exist at all) are usually very expensive.

It is virtually impossible to anticipate, by analysis or intuition, the winds that will be caused by a structure, since they are determined by very complex interactions of forces. It is possible to predict wind patterns and pressures around structures by testing scale models in a wind tunnel that can simulate natural winds near the ground. This allows the designer to foresee possible environmental and mechanical problems and alleviate them before the building is erected.

The purpose of this study is to determine the wind and comfort conditions on the site before and after construction of the proposed project, and to assist the designer to avoid climate- and wind-related problems.

II. SUMMARY

Wind tunnel tests were conducted on a scale model of the proposed structure to determine the building's effect on wind and pedestrian comfort and safety near the site.

The site currently has low to moderate winds compared to other areas of San Francisco. Winds vary considerably with location near the project; the highest winds are found on the east side of Montgomery Street north of the site. The area is shadowed during all seasons.

The effect of the proposed building on winds would vary with location, with some areas experiencing increases and others decreases. Winds would be increased close to the site and would decrease along Montgomery Street opposite the site and

to its east along Bush Street. The project would increase shadows along Bush Street across from the site in spring, summer, and fall. The courtyard area would be shadowed all year.

The project would increase pedestrian discomfort slightly due to chilling by the wind. The greatest increase would occur on the north side of Bush Street, where both winds and shadows would increase. East of the site, comfort would improve due to lighter winds.

III. SITE DESCRIPTION

The project site is the southeast corner of Montgomery and Bush Streets in the San Francisco Financial District. It is now occupied by four buildings 65, 57, 50, and 22 feet high. The surrounding area is entirely developed, so that the site is sheltered for all wind directions except west and southwest.

The proposed project is a 416-foot high-rise with a courtyard abutting its east side. The building is recessed at street level, allowing pedestrian circulation from the courtyard to Montgomery Street.

IV. PROJECT INFLUENCE ON WIND AND COMFORT

A. ELEMENTS OF COMFORT IN SAN FRANCISCO

The elements that influence comfort are temperature, humidity, sunshine, precipitation, and wind. Their relative importance varies with geographical location and the characteristics of the local climate. For the San Francisco region, the most important factors are temperature, solar radiation, and wind.

Temperatures in San Francisco are moderate owing to the influence of marine air. Temperatures are highest in fall and

lowest in winter; both spring and summer are normally cool, with a high frequency of low clouds and fog.

The intensity and frequency of sunshine are normally integrated into a single figure and expressed as "percentage of possible sunshine." San Francisco has two peak periods of sunshine, in April and in September. These months normally correspond to the transition periods between the strong marine airflow of summer and the transient storms of winter.

Wind in San Francisco is strongest in late spring and throughout the summer months, and lightest in winter. Summer winds have a large daily variation, with light winds during night and morning hours and peak winds in the afternoon. Westerly winds are dominant in all months but December and January.

The planner or architect has no control over outdoor temperatures. He does, however, have some control over the pattern of sunlight and shade and the speed of the wind. In the cool climate of the Bay Area, providing a comfortable outdoor environment requires maximizing exposure to sunlight while reducing winds as much as possible.

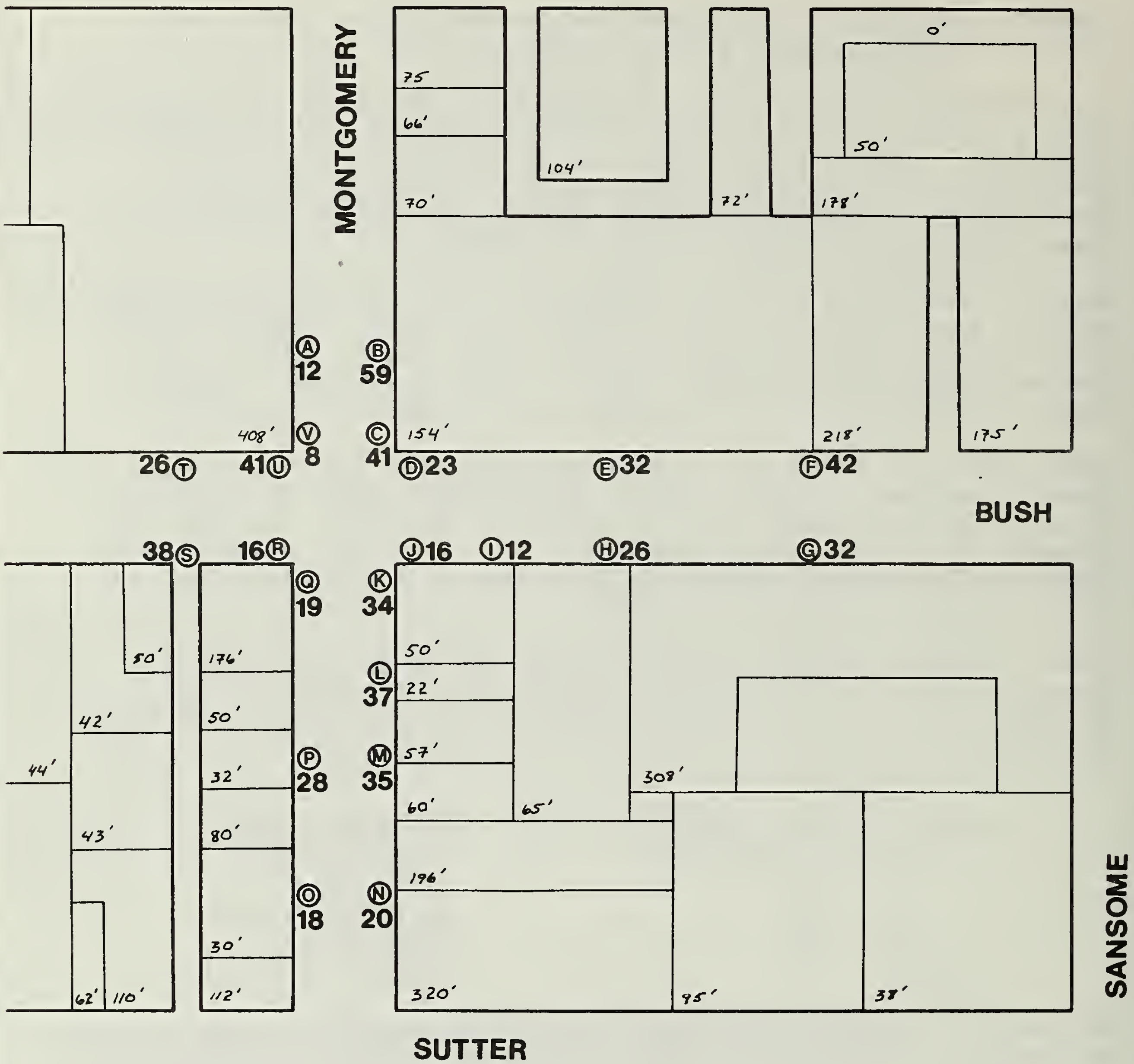
Winds on the site have been analyzed in terms of the Wind Strength Index (WSI), which is explained in Section VI.B3. The WSI integrates wind measurements over all wind directions to produce a single value that can be interpreted as follows:

Wind Strength Index	Interpretation
0 - 20	Low winds
21 - 44	Moderate winds
45 - 70	High winds
above 70	Very high winds

Frequency of discomfort and average wind speed are proportional to the WSI. Based on the above, changes in WSI of about 15 are considered significant, since they are likely to cause changes in category.

Wind Strength Index values for the existing site are shown in Figure 1. Values are generally low to moderate; the highest value, 59, is found at Point B, on the east side of Montgomery Street north of the site. The pedestrian areas immediately adjoining the site have moderate values along Montgomery and low values along Bush Street.

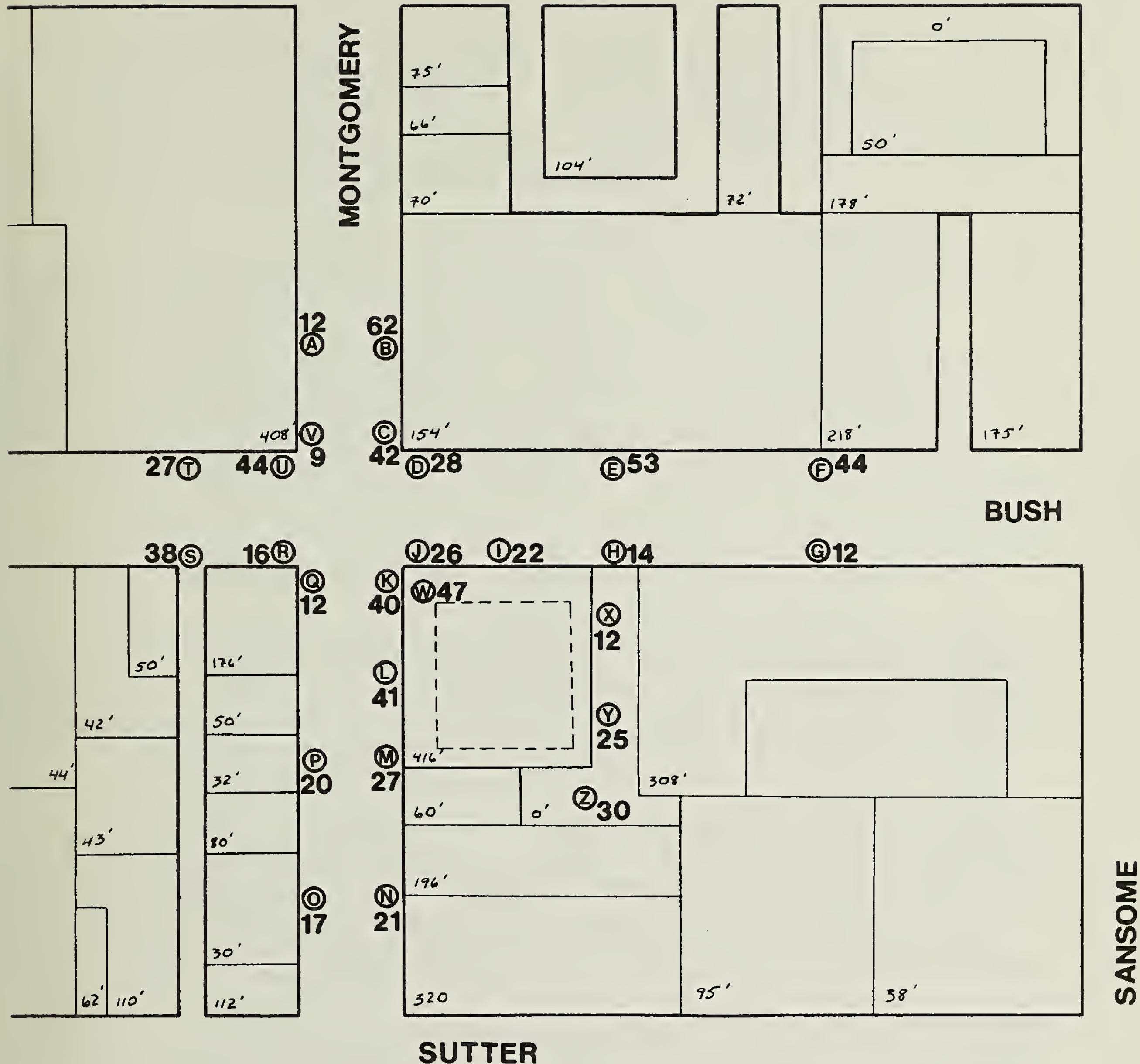
Figures 3, 4, and 5 show areas currently in shadow at 1 p.m. on the first day of each season. In winter, all pedestrian areas



EXISTING SITE WIND STRENGTH INDEX

(See Section VI.B.3 for definition)

FIGURE 1



PROPOSED SITE WIND STRENGTH INDEX

(See Section VI.B.3 for definition)

FIGURE 2

except the northeast and southeast corners of the Montgomery-Bush intersection are in shadow. During spring or fall the east side of Montgomery near the project site and the north side of Bush opposite the site are sunny. Considerably more area is sunny in summer; however, the west side of Montgomery and the south side of Bush are in shadow.

On the basis of the Wind Strength Index and the extent of shadows in pedestrian areas near the site, discomfort frequencies are probably low to moderate. Along Montgomery Street adjacent to the site, winds are moderate but sunshine is frequent. Along Bush (near the site), winds are low, but the area is generally shadowy. Higher discomfort frequencies occur along Montgomery north of the site and along Bush east of the site, where winds are moderate to high and the area extensively shadowed.

C. SITE CONDITIONS WITH THE PROPOSED PROJECT

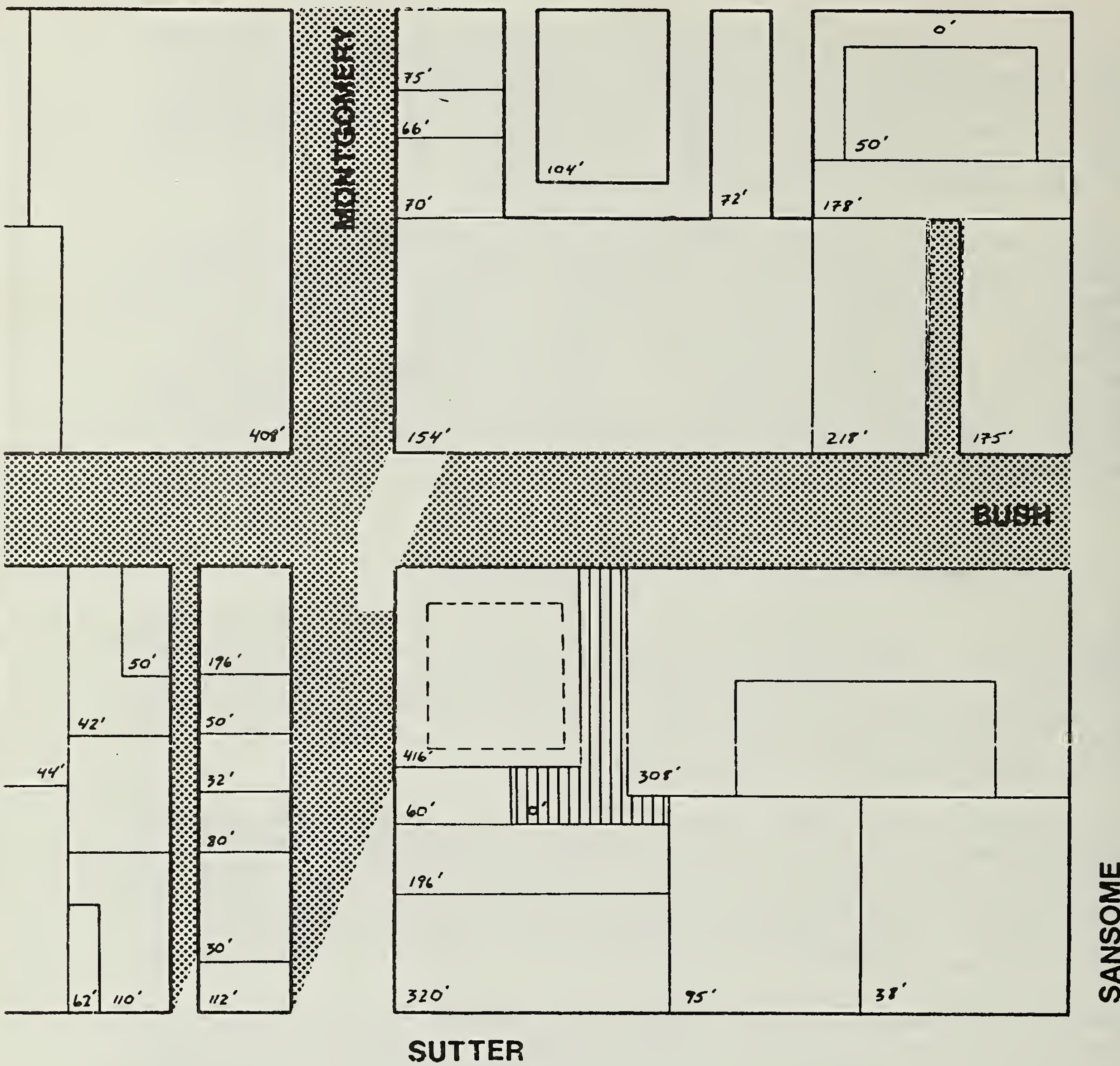
The effects of the project on winds near the site would vary (Figure 2). Winds would be increased adjacent to the proposed structure. Along its Montgomery Street side, increases would be small (on the order of 5 WSI units) and winds would remain low. Along the Bush Street side, winds would increase from a "low" to a "moderate" classification.

The project would reduce winds along Montgomery Street opposite the site and would have little effect along Montgomery to its north or along Bush to its west. East of the site, winds would be reduced along the south side of Bush and increased along its north side. The largest increase would occur at Point E, where current "moderate" winds would increase to "high" winds.

Changes in shadow patterns associated with construction of the proposed project are shown in Figures 3, 4, and 5. In winter (Figure 3) the entire area is dominated by shadows from existing buildings, and the project causes no increase in area of shadow. The proposed courtyard would be fully shaded.

In fall and spring (Figure 4), the project would shadow the area north of the site along Bush Street, and the courtyard would be completely shaded.

In summer (Figure 5), the project would create a large new area of shadow on the north side of Bush. Again, the courtyard would be entirely in shadow.



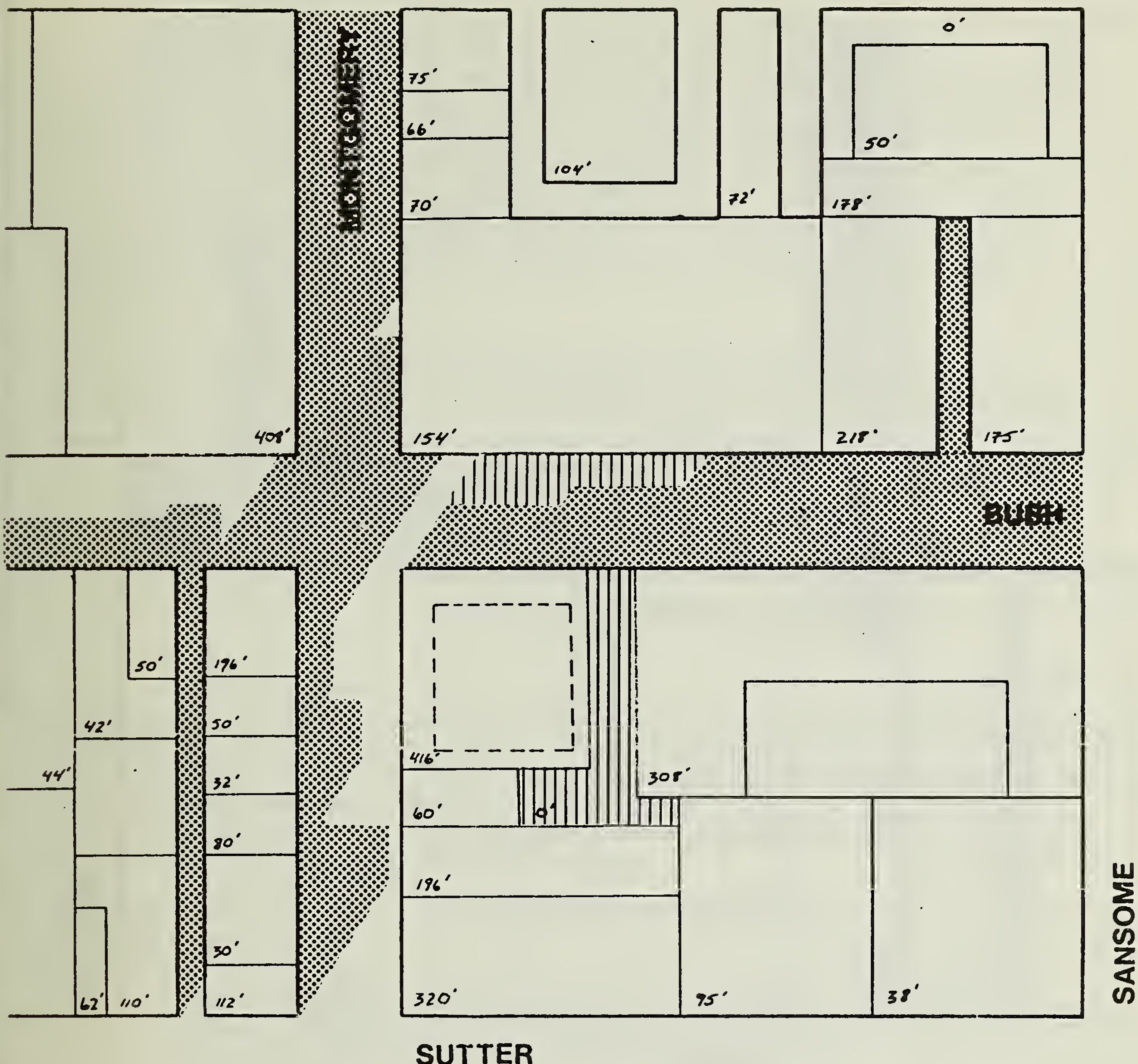
EXISTING SHADOW
PROJECT SHADOW

WINTER : 1 PM

PROPOSED SITE SHADOW DIAGRAM

N

FIGURE 3

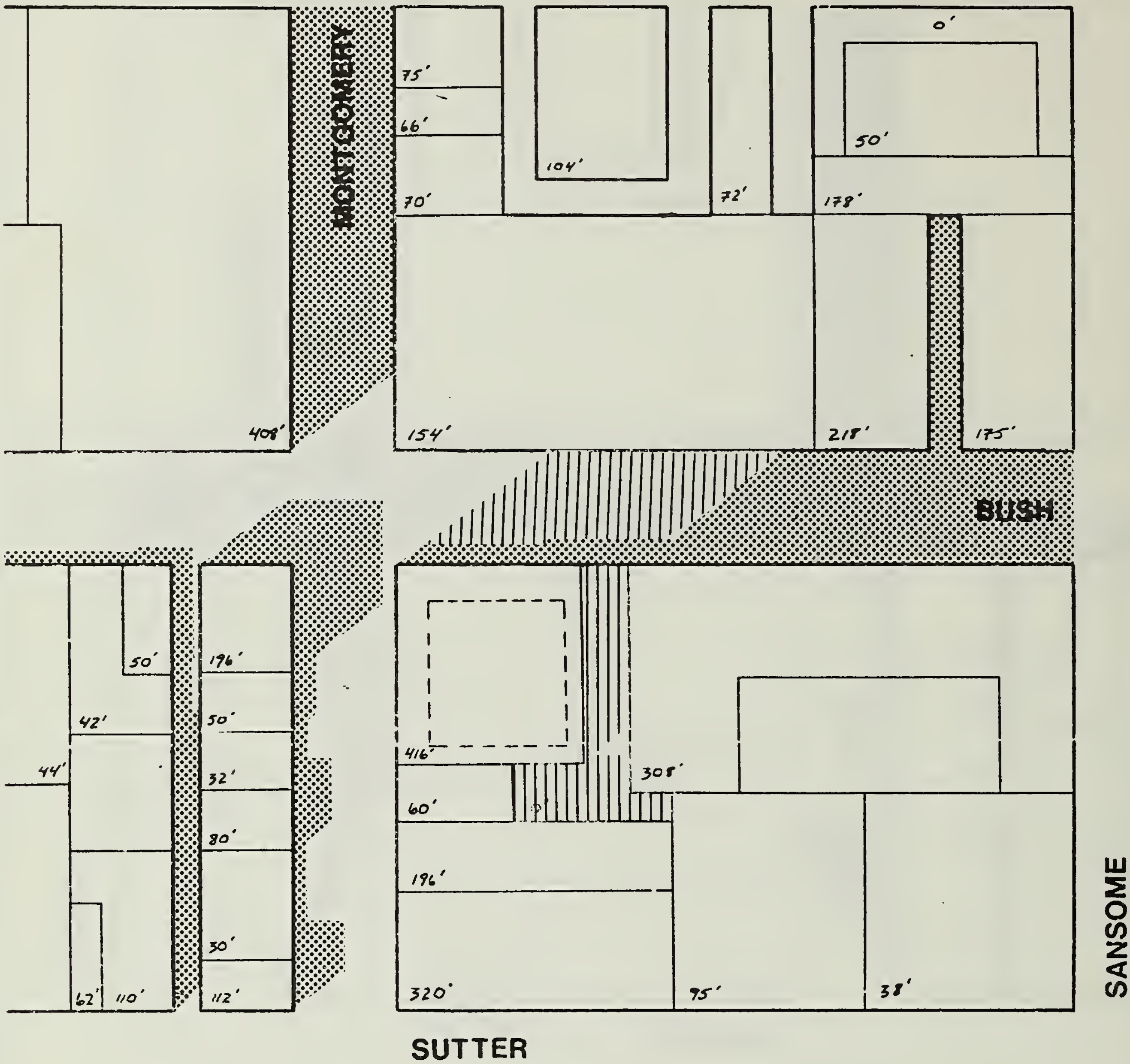


EXISTING SHADOW
PROJECT SHADOW

SPRING/FALL: 1PM

PROPOSED SITE SHADOW DIAGRAM

FIGURE 4



EXISTING SHADOW
PROJECT SHADOW

SUMMER: 1 PM

PROPOSED SITE SHADOW DIAGRAM

N

FIGURE 5

The resulting effect on the frequency of discomfort would vary across the study area, Increases in winds along the east side of Montgomery would result in slightly higher discomfort frequencies. Along the south side of Bush Street, discomfort frequencies would increase near the site but would decrease to its east. The greatest impact would be exerted on the north side of Bush opposite the site, where substantial increases in winds and shadows would raise the frequency of discomfort noticeably. Little effect would be felt west of the Bush-Montgomery intersection.

The courtyard east of the building would have little or no sunlight and would have low to moderate winds. The frequency of discomfort in this area would be similar to that currently existing along the south side of Bush near the project site.

V. MITIGATION OF ADVERSE WIND EFFECTS

Measures to reduce winds and increase comfort can be developed at several scales, ranging from large-scale modifications of the project's grading plan to construction of small wind barriers in important areas. The following is a discussion of possible design modifications that would reduce winds and increase comfort, starting at the largest scale.

In considering these possible modifications, two factors should be considered:

- These measures are based on aerodynamic principles alone. Other factors such as cost, aesthetics, and access must also be considered.

- The effectiveness of each possible measure has not been quantified. The actual ability of a measure to reduce winds can be determined only by further experimentation in a wind tunnel.

A. MODIFICATIONS TO THE STRUCTURE

A variety of building modifications can reduce exposure to wind. Building height, shape, bulk, width, orientation, surface treatment, and location with respect to other structures all affect

winds. Of these factors, location, shape, and orientation are determined by the lot and are not variable.

Reduction in building height would result in smaller wind-speed increases. Although the actual decrease with a smaller size is not known, decreases would be roughly proportional to the percentage reduction in proposed building height. For example, the resulting wind increases (and wind decreases in some areas) from a 10 percent height reduction would be roughly 10 percent. Taller buildings cause greater changes in wind speeds. Increasing the height of the building to 500 feet would increase the project's effect on winds by 20 percent.

Use of the site solely as an urban plaza was not studied in the tunnel; therefore, quantifiable effects cannot be given. It is known, however, that such a plaza would be shadowed much of the day by the Standard Oil Building to the east and the Equitable Life Building to the south. The eastern portion of such a plaza would be exposed to strong winds caused by the Standard Oil Building and would frequently be uncomfortable.

Other building shapes could reduce winds, although the shape of the lot is a constraining factor. Elimination or modification of the pedestrian area created by the building's setback at the ground floor could improve wind conditions to a minor extent. Elimination of the setback, however, would remove the pedestrian refuge from rain that is offered by the overhang.

Wind conditions in the courtyard east of the building could be improved by architectural modifications. A glass wall with a door (preferably revolving) on the ground-level passage south of the building between the courtyard and Montgomery Street would significantly reduce winds in the courtyard. Placing the courtyard below grade would have a similar effect and would not reduce the frequency of sunlight since no sunlight would reach the courtyard.

B. LANDSCAPING

Landscaping is not an effective method of making major modifications in wind-flow patterns but is useful in creating local areas of shelter where needed. Provision of substantial vegetation would reduce winds throughout the site. To be most effective, vegetation should be dense and should extend from near ground level to at least 15 feet high. While any vegetation absorbs the momentum of the air and reduces winds,

proper selection of plant type, height, spacing, and orientation is necessary to maximize the mitigating effect.

All pedestrian areas near the building would benefit from planting of substantial vegetation. Since these areas are rarely in sunlight, the effect of vegetation would be to reduce winds, leaving sunlight patterns unchanged.

Bus shelters would increase pedestrian comfort by offering protection from wind and rain.

VI. METHODOLOGY

A. MODEL, WIND TUNNEL, AND TESTING METHODOLOGY

A complete description of model-making methodology, the wind tunnel facility, and the testing methodology is given elsewhere (San Francisco Department of City Planning 1976).

B. WIND STRENGTH INDEX

The wind at a given location, and the resulting level of comfort experienced, depend on several factors at different scales. On the local scale, terrain and building geometry affect wind strength and direction by blocking, channeling, diverting, deflecting, or accelerating winds. At pedestrian levels the wind pattern may be quite distorted even though the wind is from one general direction. This pattern of local winds will, of course, change as the general wind direction changes, so there is no one wind pattern that can be defined for a site.

Because the wind pattern at a site varies with direction, the frequency of each wind direction is very important. The importance of an extreme wind acceleration around a building corner under a north wind is greatly diminished, for example, if north winds occur only one percent of the time.

Both of the above factors are included in the derivation of the Wind Strength Index (WSI). The steps involved in computing the WSI are:

1. For each wind direction (in this case, the five

most important directions), the strength of the wind is measured at every point of interest on the site.

2. At each point of interest, wind strength for each direction is weighted by the frequency of winds from that direction. To obtain the WSI, these values are summed and converted to percentages.

Use of the Wind Strength Index results in a single map that summarizes the wind measurements made for all wind directions. Based on WSI values computed for other areas of San Francisco, the plotted WSI values can be interpreted as follows:

Wind Strength Index	Interpretation
0 - 20	Low winds
21 - 44	Moderate winds
45 - 70	High winds
Above 70	Very high winds

The pattern of the Wind Strength Index represents the pattern of winds that would be experienced on the site over a long period of time (a year, for example). On any given day, of course, the actual wind pattern on the site could vary greatly from the WSI pattern. As a direct measure of average winds, the WSI is also a direct measure of the frequency of wind-caused discomfort. While a specific frequency of discomfort cannot be specified for a given WSI value, discomfort frequency is proportional to WSI. Because it is based on mean wind measurements, the WSI does not account for turbulence. Areas where turbulence would be expected would have a higher frequency of discomfort than indicated by the WSI.

VII. TECHNICAL DATA AND DISCUSSION

The following is a discussion of wind conditions on the site for each wind direction investigated. Information on wind directions over the site is shown in Figures 6 through 15. The wind direction at each measurement point is shown. The major flow path over the site, when applicable, is indicated by a large arrow.

Individual wind speed measurement data are presented in Table 1.

Measured wind speeds are expressed as percentages of the calibration wind speed, which corresponds to the actual wind speed at the San Francisco Weather Station at 50 Fulton Street. Thus a value of 0.52 means that the measured wind speed is expected to be 52 percent of the wind speed recorded by the Weather Service when winds are from that particular direction.

The values can be interpreted in terms of general "windiness" using the scale below. This scale is subjective and is based on information gathered from studies in San Francisco.

Velocity	Relative Wind Value
Low	0.00 - 0.19
Moderately low	0.20 - 0.29
Moderate	0.30 - 0.49
Moderately high	0.50 - 0.69
High	0.70 - 1.00
Very high	Above 1.00

It should be noted that the plotted values are not actual wind speeds, but ratios. Thus a point having "very high" wind speeds would still experience light winds on a near-calm day. Likewise, a point found to have "low" winds could experience significant winds on an extremely windy day.

A. NORTHWEST WIND

Northwest winds occur 12 to 39 percent of the time in San Francisco, depending on the season. (In meteorology, a northwest wind blows <u>from</u> the northwest.) Northwesterly and westerly winds are the most frequent and strongest winds at all seasons in San Francisco. Northwest winds exceed 13 miles per hour 35 percent of the time and 25 miles per hour 3 percent of the time in summer. Wind frequencies and speeds are lower in spring, fall, and winter.

Existing Site

Figure 6 shows that existing wind flow patterns. Arrows indicate wind direction; double circles around the points indicate turbulent areas.

The major wind movement is down Bush Street, and there are

Table 1 Relative Wind Values

(Keyed to Locations on Appendix F Figures)

	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Point	NW	NW	W	W	SW	SW	S	S	SE	SE
A	.13	.13	.11	.11	.11	.11	.11	.09	.13	.17
B	.40	.40	.70	.79	1.02	.98	.69	.69	.10	.15
C	.34	.34	.49	.57	.50	.43	.24	.29	.10	.15
D	.23	.28	.19	.28	.30	.36	.36	.36	.08	.06
E	.23	.34	.38	.74	.55	.70	.40	.49	.06	.08
F	.28	.28	.53	.60	.61	.68	.40	.29	.13	.13
G	.23	.09	.38	.13	.43	.16	.29	.09	.13	.13
H	.21	.13	.30	.13	.36	.25	.33	.13	.08	.10
I	.15	.23	.09	.23	.11	.23	.16	.09	.08	.06
J	.15	.26	.09	.30	.34	.27	.29	.16	.10	.08
K	.30	.28	.45	.51	.30	.52	.29	.40	.06	.06
L	.38	.28	.43	.38	.30	.30	.29	.29	.08	.06
M	.43	.30	.36	.30	.27	.18	.29	.27	.08	.06
N	.34	.36	.13	.11	.11	.11	.24	.24	.08	.08
O	.19	.13	.13	.13	.11	.11	.24	.24	.52	.52
P	.36	.21	.21	.17	.23	.18	.31	.31	.29	.29
Q	.09	.19	.26	.26	.16	.14	.09	.09	.19	.19
R	.15	.15	.13	.13	.32	.32	.16	.16	.10	.10
S	.38	.38	.45	.45	.36	.36	.16	.16	.21	.19
T	.15	.17	.36	.36	.36	.36	.16	.16	.08	.06
U	.13	.15	.57	.60	.89	.89	.36	.36	.06	.06
V	.09	.09	.06	.06	.09	.09	.09	.07	.13	.21
W		.32		.62		.70		.33		.08
X		.09		.11		.20		.16		.06
Y		.19		.30		.70		.18		.06
Z		.21		.38		.45		.11		.04

turbulent areas on Montgomery. Table 1 gives the relative wind values for each point in Figure 6. The site is generally calm; winds are in the low to moderate range. The highest value, 0.43, is at point M, at the southeast corner of the site.

Site with Proposed Building

As shown in Figure 7, wind flows with the proposed building would be generally the same, with the exception of the flow moving north on Montgomery Street, which would cut across Point W under the overhang. Wind would move toward the north in the courtyard. The relative wind values for each point are given in Table 1; they would both increase and decrease. Point M would decrease from 0.43 to 0.30, and the other points on Montgomery Street in the same flow would decrease. Winds would be generally low to moderate.

B. WEST WIND

West winds occur 15 to 40 percent of the time, depending on the season. West winds exceed 13 miles per hour 29 percent of the time and 25 miles per hour 7 percent of the time in summer. Wind strengths and frequencies are somewhat lower in spring, fall, and winter.

Existing Site (Figure 8)

The main wind movement is east down Bush and north on Montgomery Street. The west side of Montgomery is turbulent.

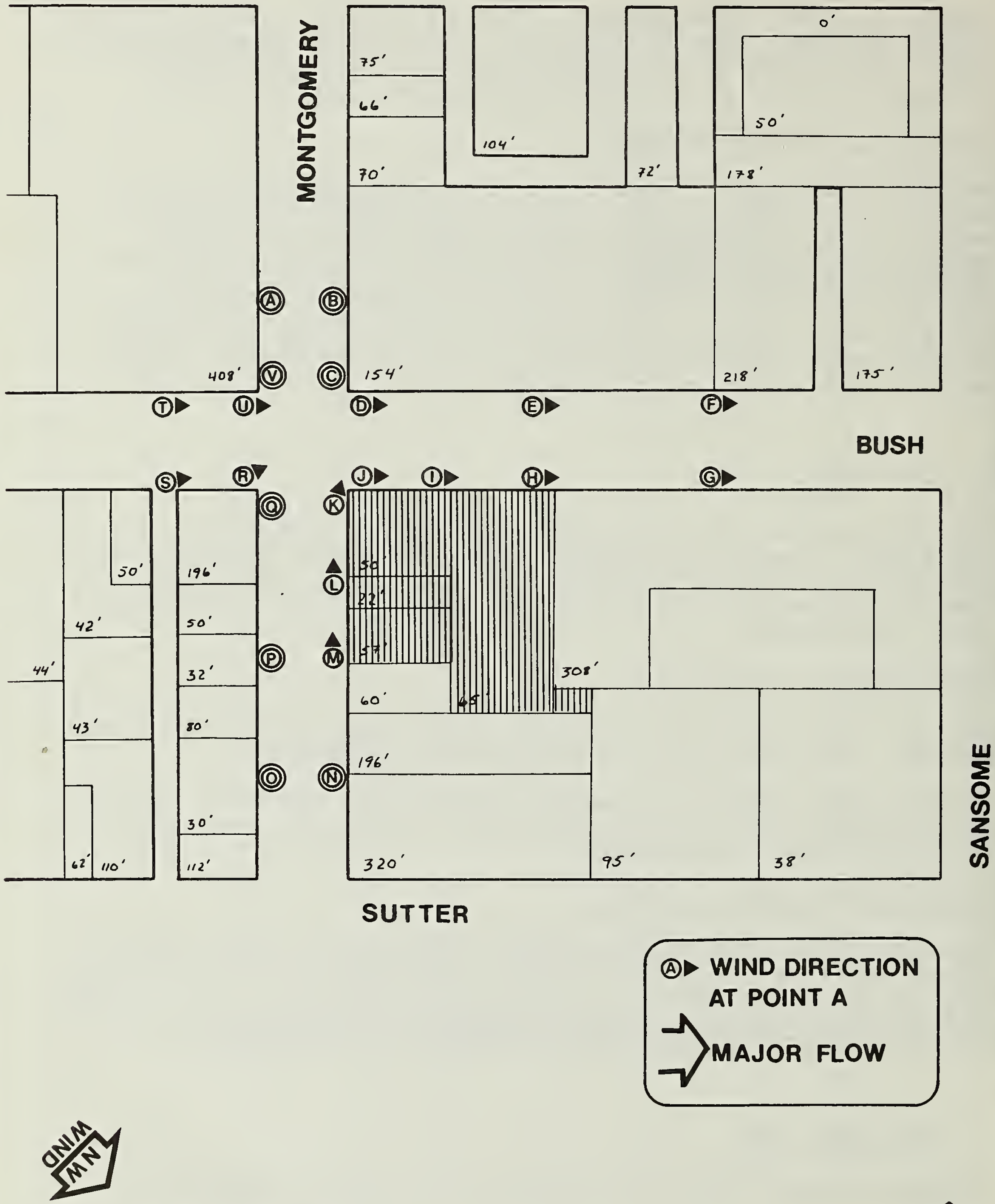
Table 1 gives existing relative wind values. Points U, B, and C have moderately high to high winds. The rest of the site is in the moderate to low range.

Site with Proposed Building

The major flow north on Montgomery Street would remain; however, values would be higher (see Figure 9 and Table 1). The relative wind values would generally increase throughout the site. Point W under the overhang would have moderately high winds. Winds in the courtyard would be low to moderate and turbulent.

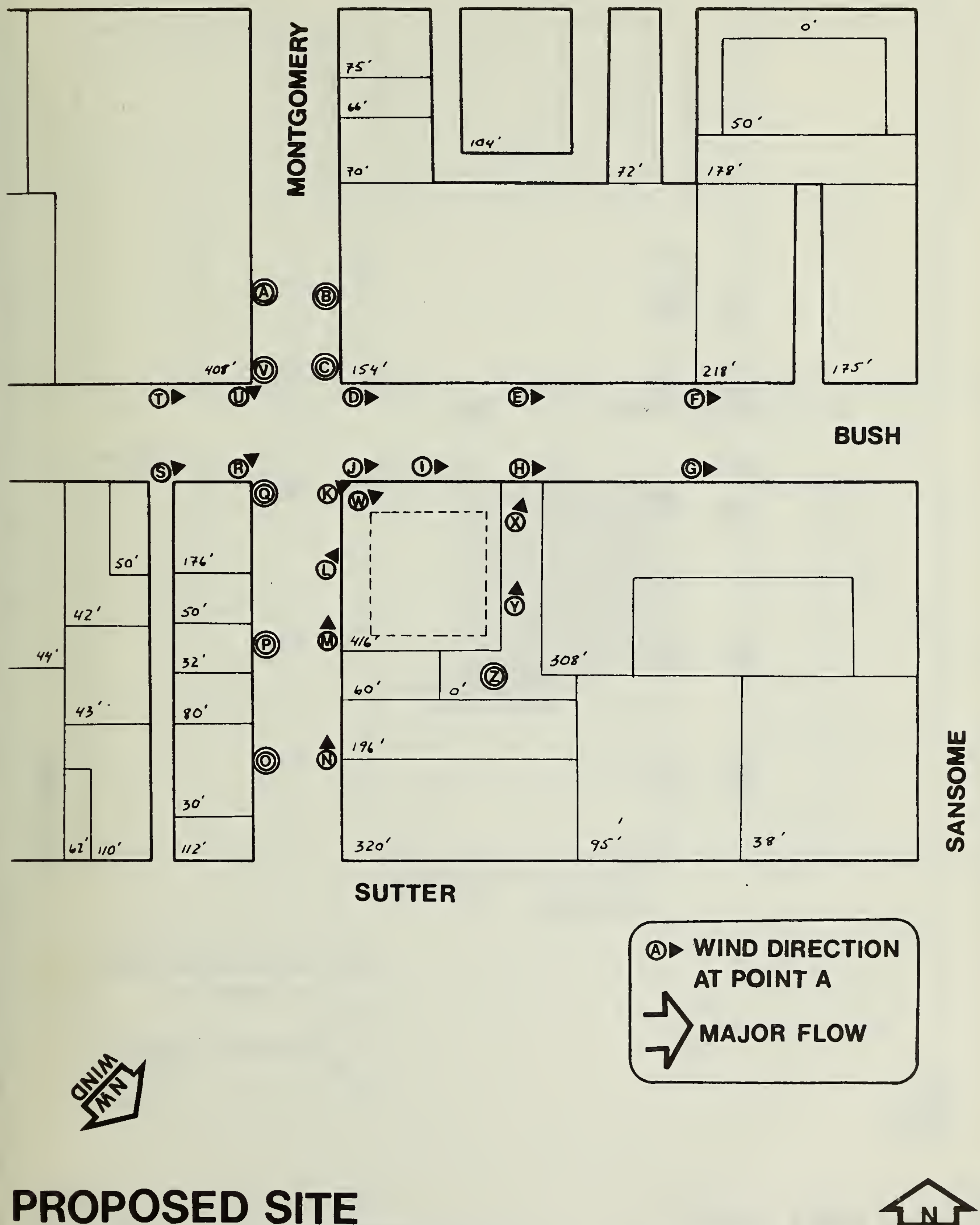
C. SOUTHWEST WIND

Southwest winds occur on an average of 9 percent annually in



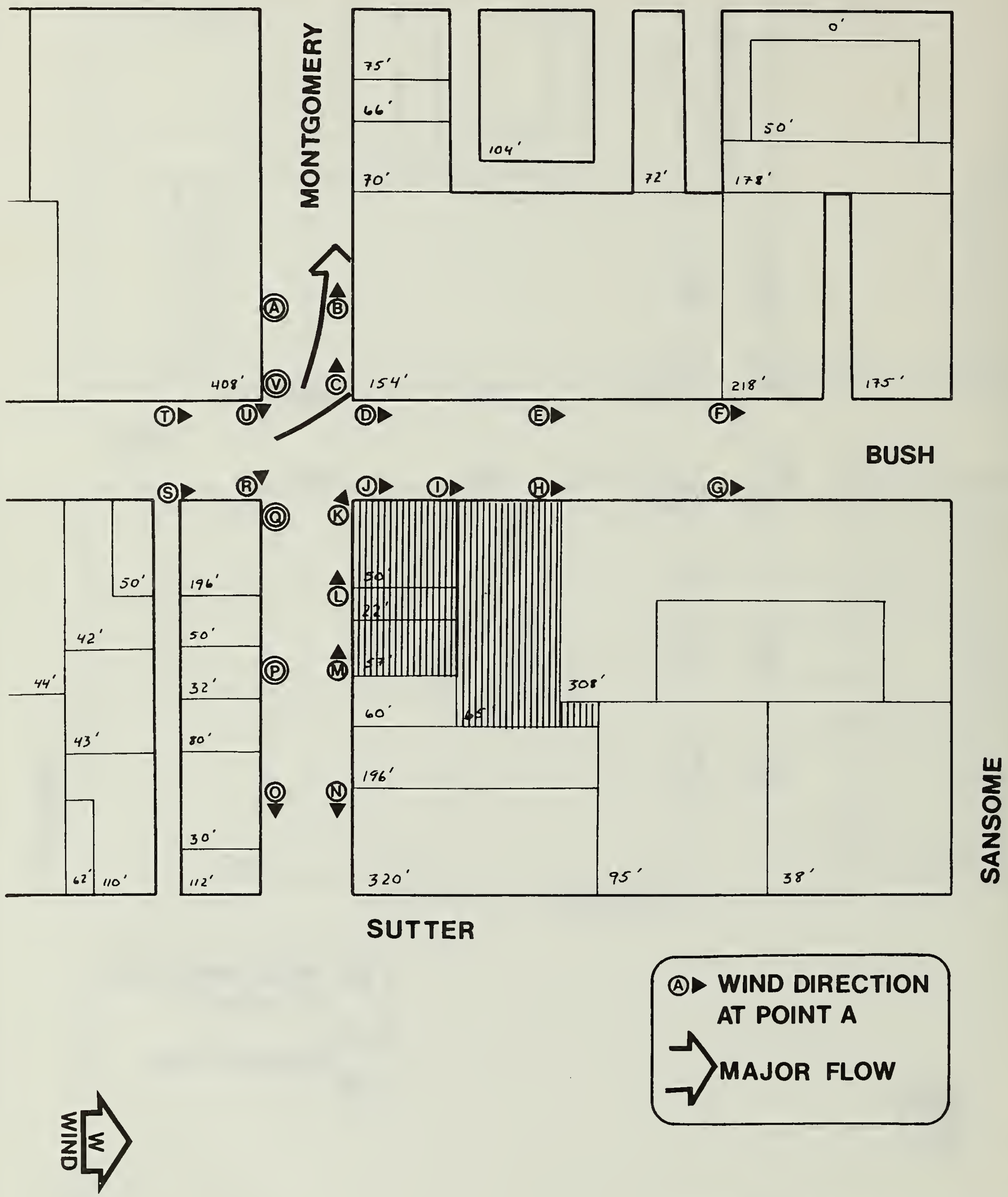
EXISTING SITE WIND FLOW PATTERNS

FIGURE 6



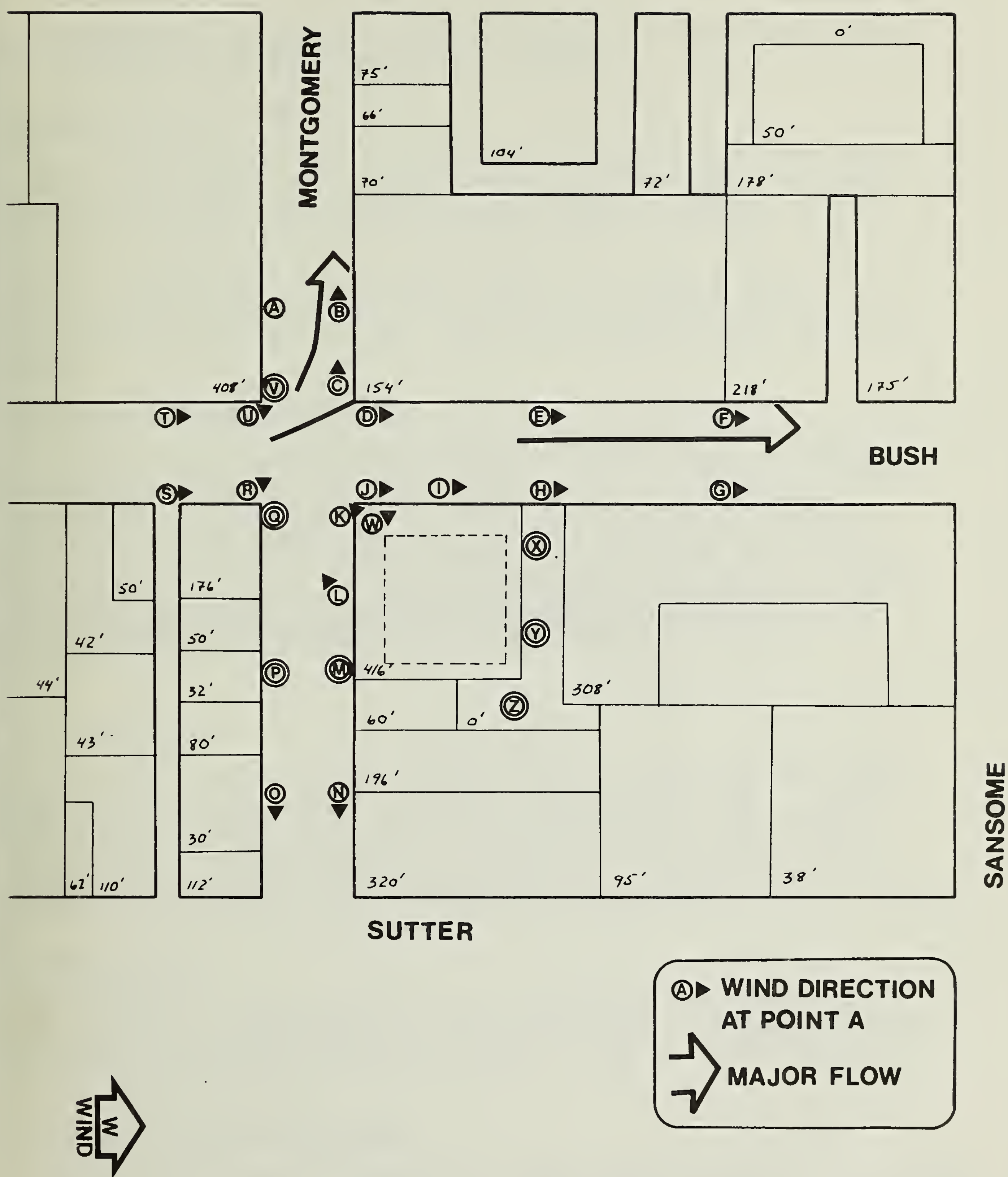
PROPOSED SITE WIND FLOW PATTERNS

FIGURE 7



EXISTING SITE WIND FLOW PATTERNS

FIGURE 8



PROPOSED SITE WIND FLOW PATTERNS

FIGURE 9

San Francisco. Winds are highest in winter, when they exceed 25 miles per hour 2 percent of the time.

Existing Site (Figure 10)

A major flow moves east on Bush Street; part of it turns the corner and moves north on Montgomery, and the rest continues eastward on Bush. Montgomery Street south of Bush is turbulent, as is the east side of Montgomery north of Bush.

Table 1 shows the relative wind values for each point. The two major flows have moderately high to very high winds. Point B has a value of 1.02. The site generally has moderate winds.

Site with Proposed Building

The major flows would remain essentially the same with the exception of Points K and W, feeding into the flow along Bush (see Figure 11 and Table 1). Point J would be somewhat shielded by the column on the corner of Montgomery and Bush. Intensity would be reduced at Points B and C and increased at Points K, E, and F. Point W would have high winds. Point Y in the courtyard would have high winds caused by a strong flow through the passage leading to Montgomery Street.

D. SOUTH WIND

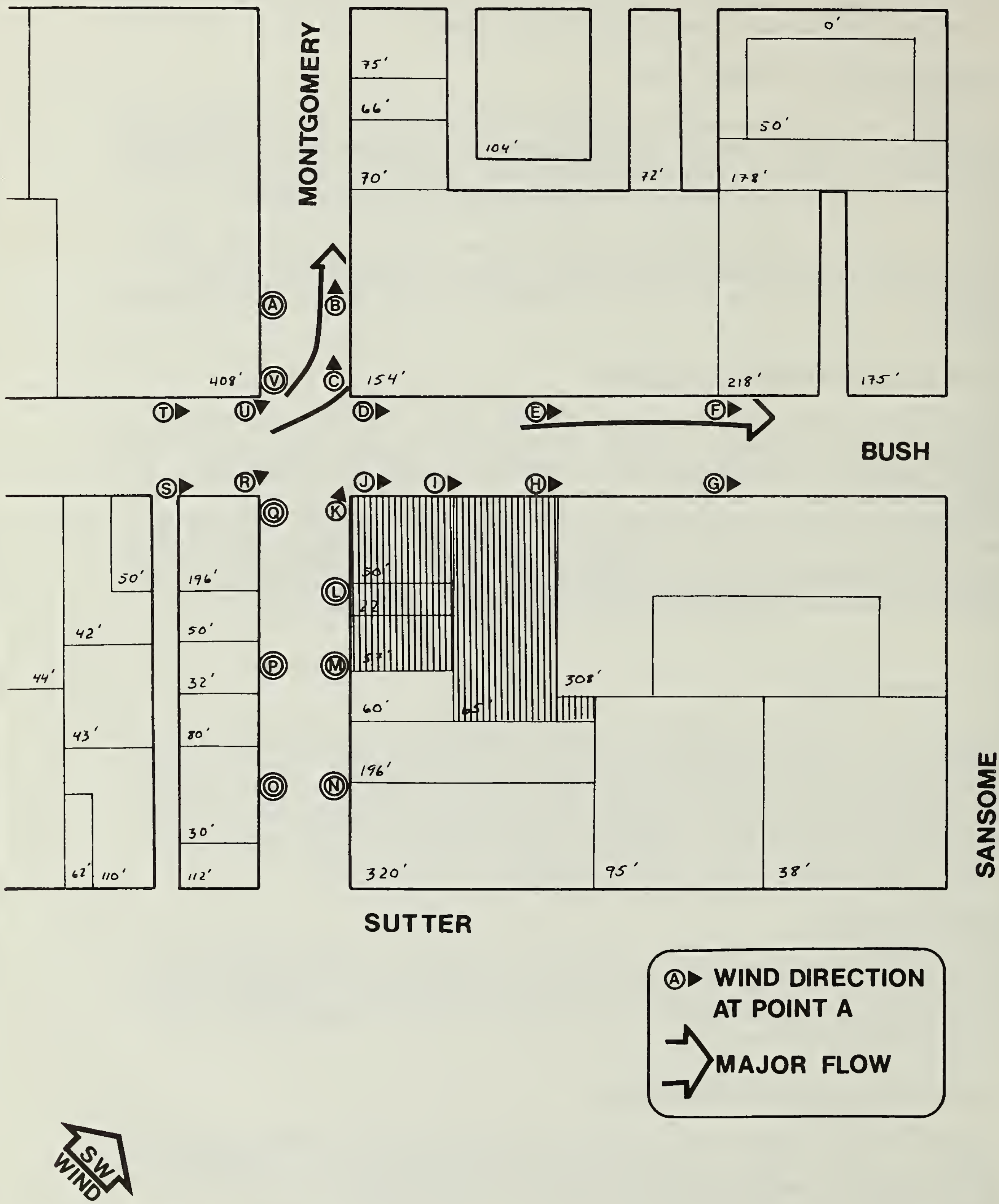
South winds are infrequent except during winter storms, when moderate to strong wind is often combined with rain. They are expected to occur 12 percent of the time in the months of December through February, exceeding 13 miles per hour 1 percent of the time. During other seasons south winds are light and occur less than 3 percent of the time.

Existing Site

South winds on the site are low to moderate (see Figure 12 and Table 1). The site is calm on the whole, except at Point B, being protected from south winds by the large buildings along Market Street.

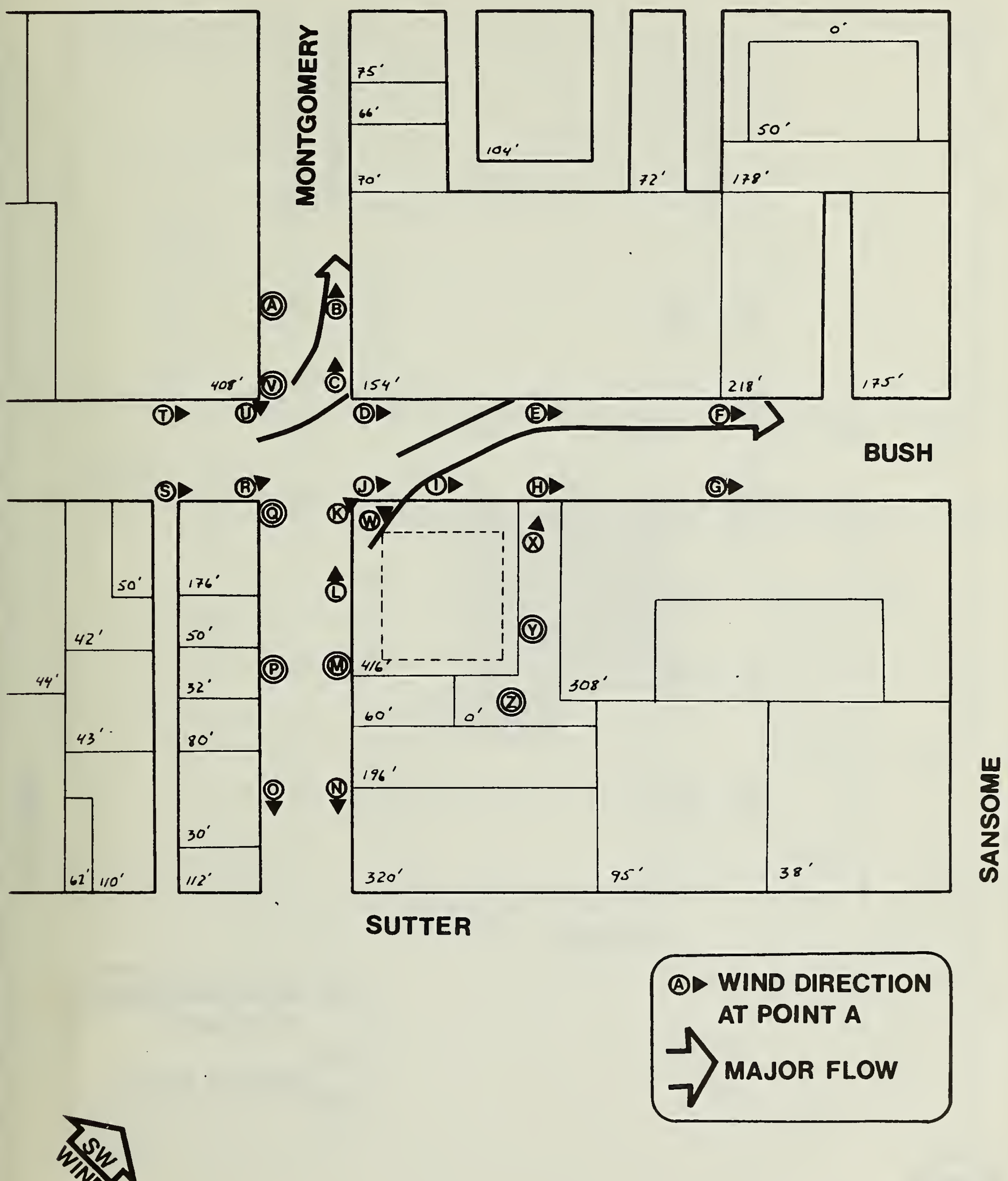
Site with Proposed Building

Little effect would be exerted on south winds except at several points where there would be small decreases and increases in wind speed. The courtyard would be calm, and Point W would have moderate winds (see Figure 13 and Table 1).



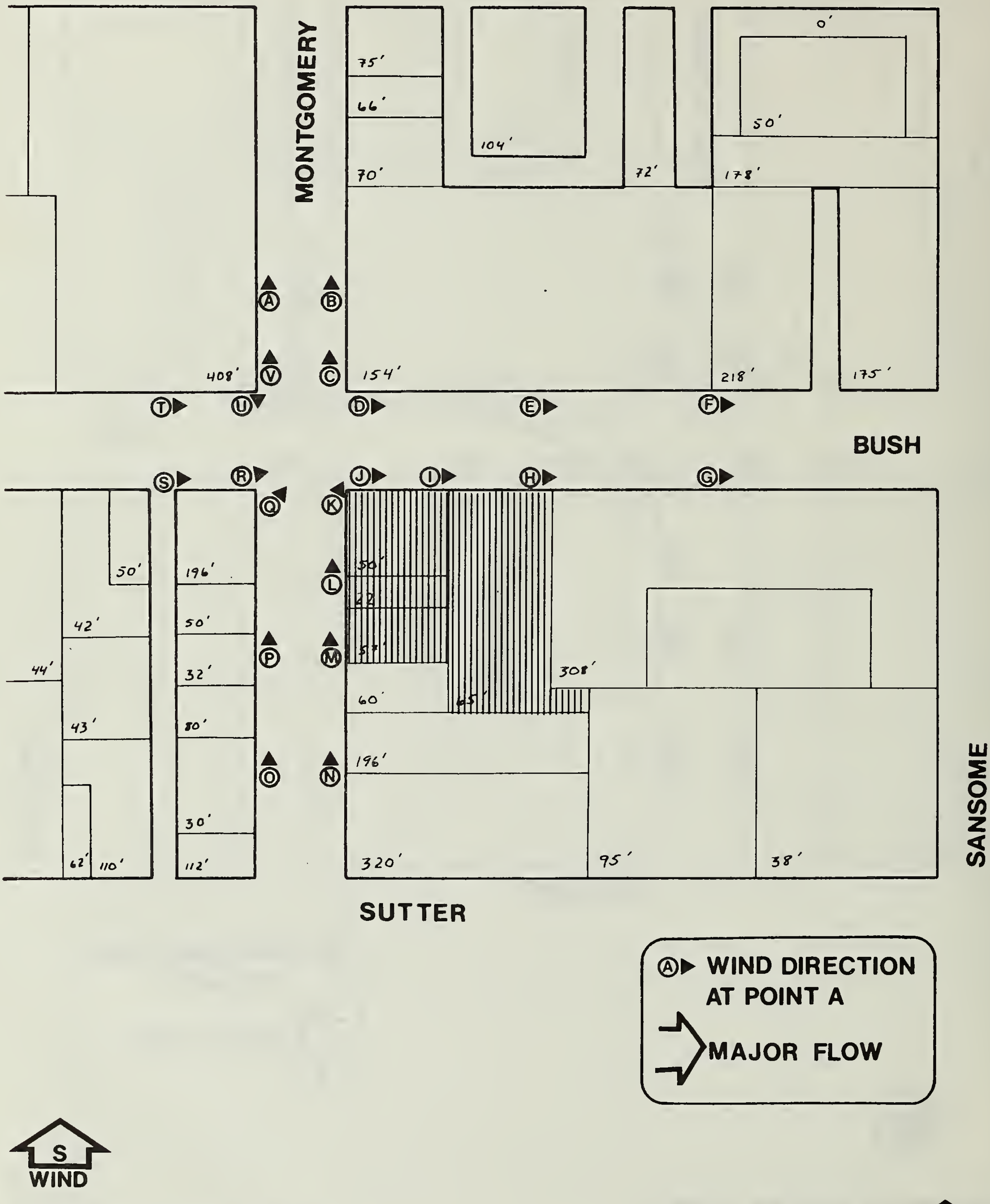
EXISTING SITE WIND FLOW PATTERNS

FIGURE 10



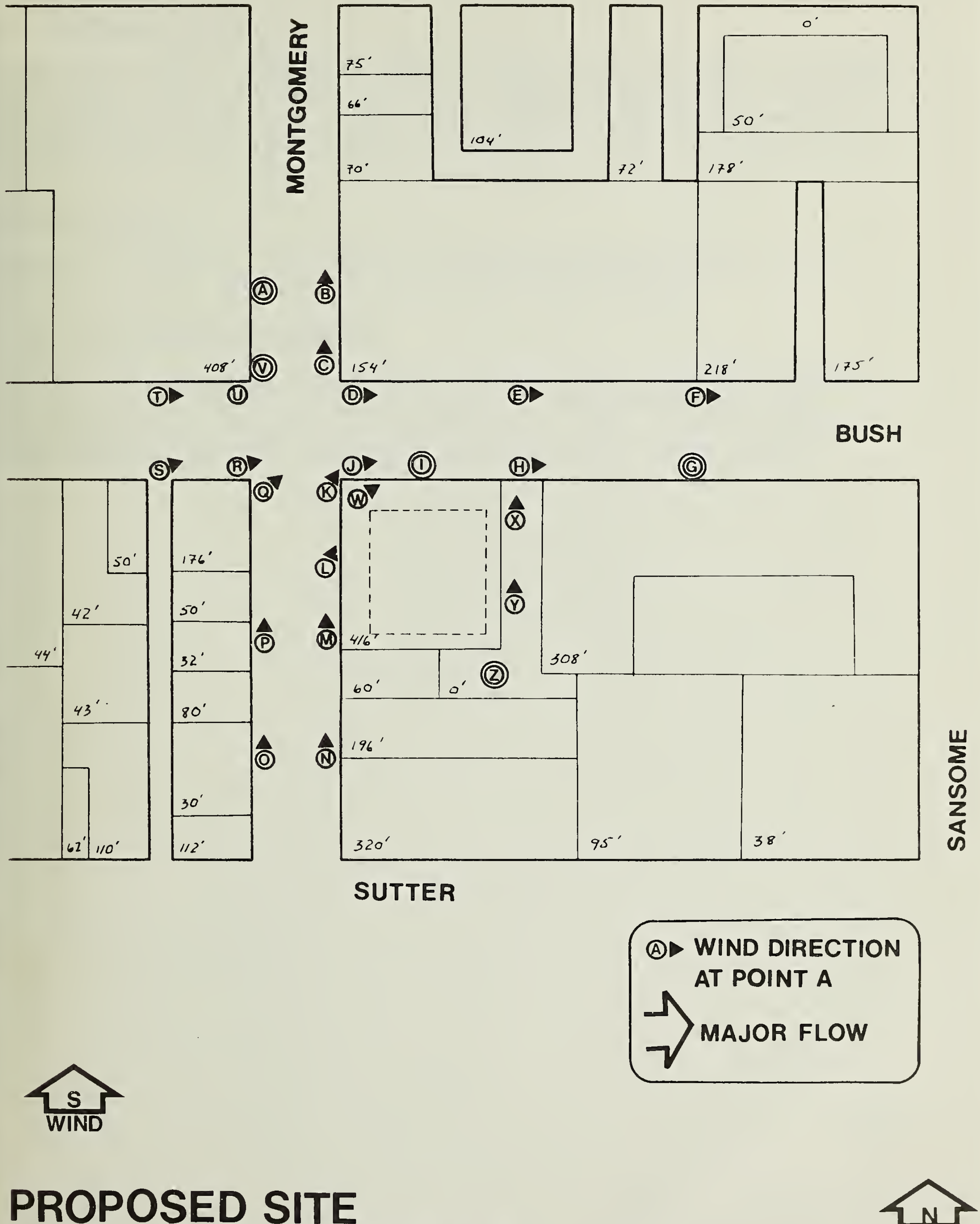
PROPOSED SITE WIND FLOW PATTERNS

FIGURE 11



EXISTING SITE WIND FLOW PATTERNS

FIGURE 12



PROPOSED SITE WIND FLOW PATTERNS

FIGURE 13

E. SOUTHEAST WIND

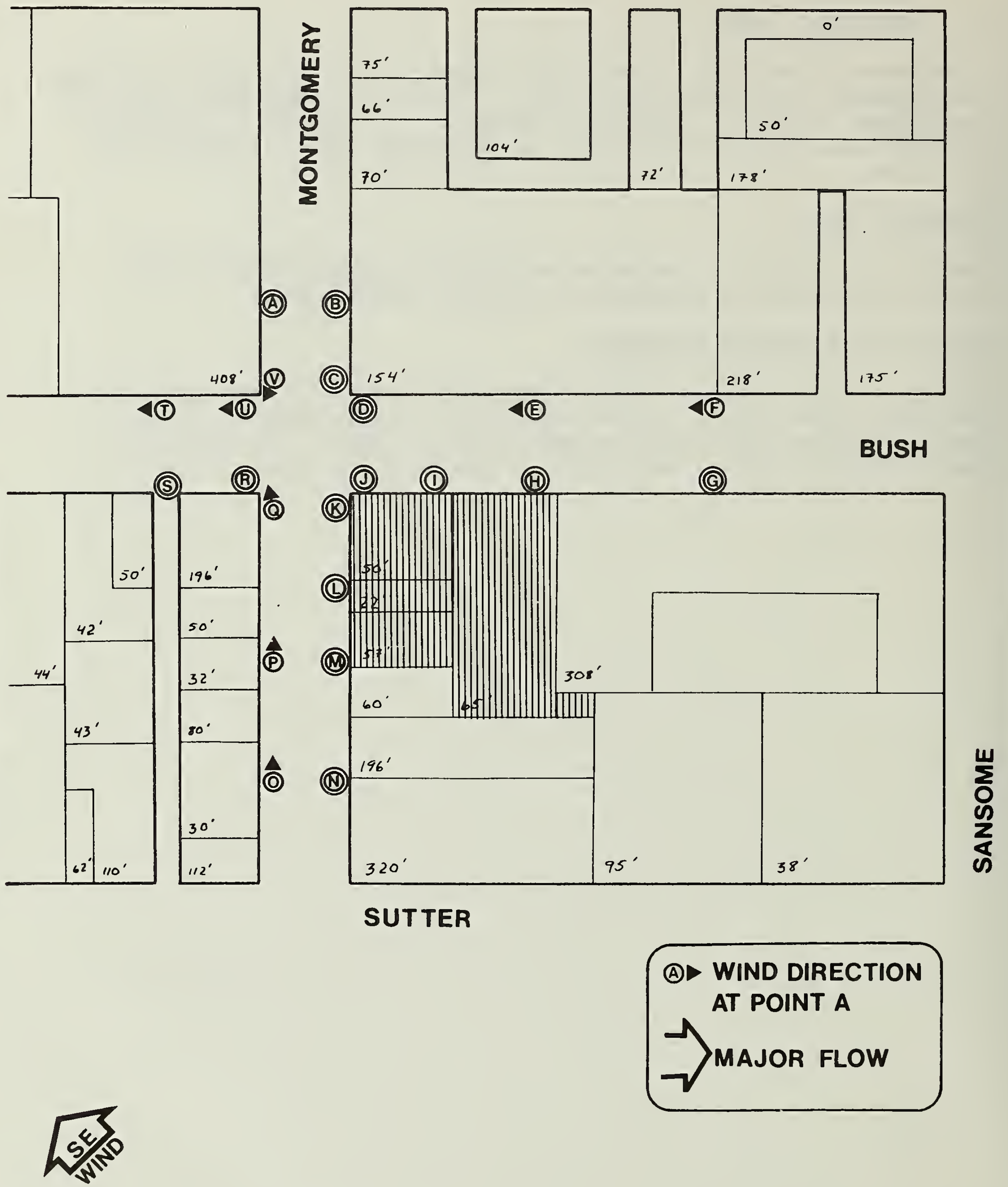
Southeast winds occur less than 3 percent of the time in spring and summer and 6 percent in fall. They are generally light during these seasons. In winter they can be expected 17 percent of the time, with speeds over 13 miles per hour 10 percent of the time.

Existing Site

Except for Point D, the site is basically calm (Figure 14), being protected by Financial District high-rises.

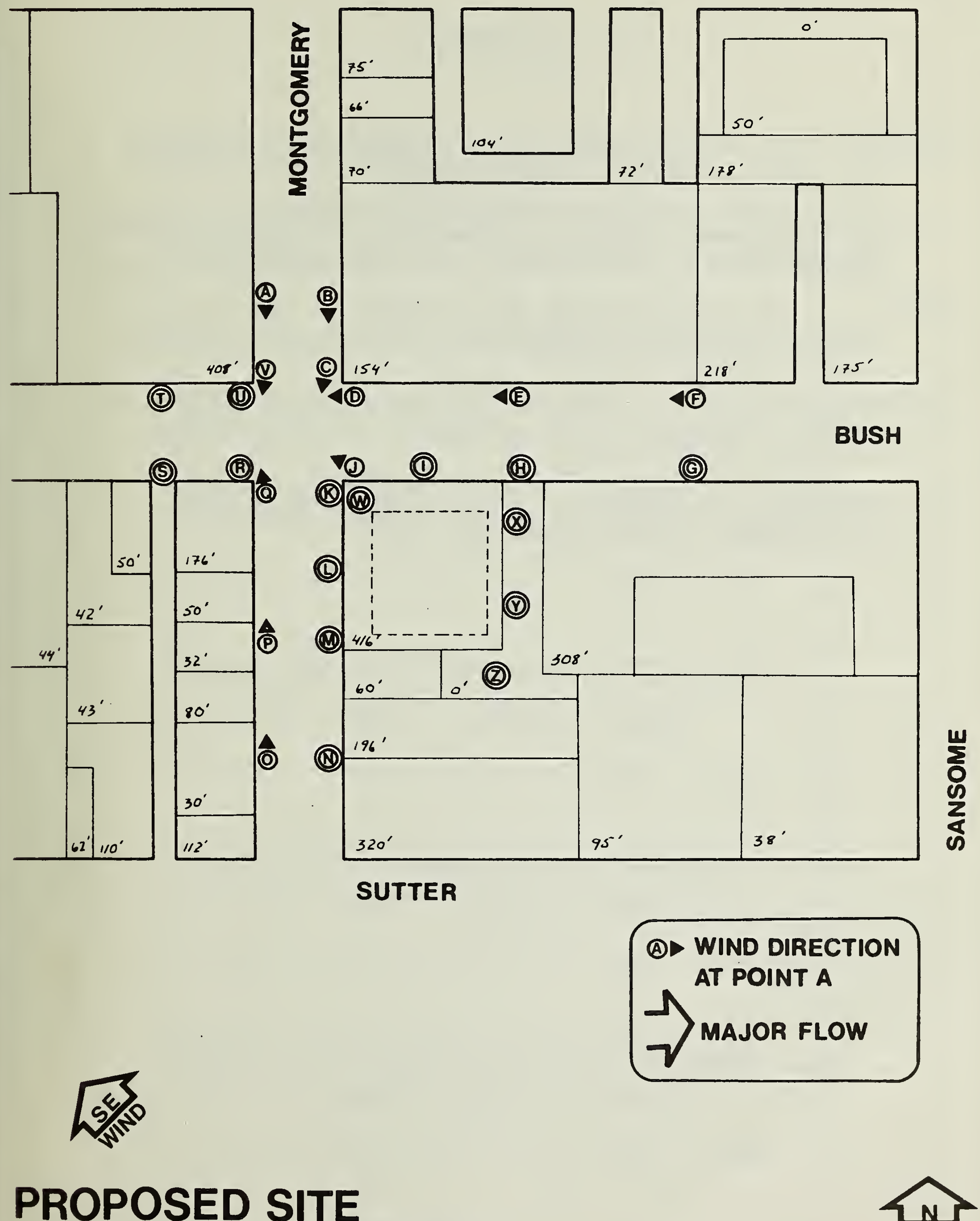
Site with Proposed Building

The site would remain calm after construction of the proposed building (see Figure 15 and Table 1). The courtyard would have low winds and would be essentially calm. Point W would have moderate winds, and Point P winds would remain high.



EXISTING SITE WIND FLOW PATTERNS

FIGURE 14



PROPOSED SITE WIND FLOW PATTERNS

FIGURE 15

VIII. BIBLIOGRAPHY

Cermak, J. E., et al. Simulation of atmospheric motion by wind tunnel flows. Colorado State University, 1966.

__________, and S. P. Arya. "Problems of atmospheric shear flows and their laboratory simulation." Journal of Boundary-Layer Meteorology, 1970, September 1, 40-60.

Lloyd, A. "The generation of shear flow in a wind tunnel." Quarterly Journal of the Royal Meteorological Society, 93 (No. 395) 79-96 (1967).

San Francisco Department of City Planning. Final Environmental Impact Report, San Francisco Executive Park. EE 75-198, August 12, 1976.

U.S. Department of Commerce. Local climatological data, San Francisco Federal Building. 1970.

SKIDMORE, OWINGS & MERRILL
ARCHITECTS - ENGINEERS
ENGINEERING DEPARTMENT CALCULATIONS

BUILDING PROPOSED HINES OFF. BLDG S.F.	MADE BY HJM	DATE 15 JUL 76	JOB NO. 11437-0
SUBJECT MECHANICAL DATA FOR E.I.R.	CHECKED BY	DATE	SHEET NO. 1 OF 7

1. FOR COMPARATIVE DATA SEE ELECTRICAL DATA SHEET 1 OF 1

2. ESTIMATED ENERGY INPUT FOR FUEL OIL

a) AVERAGE FUEL OIL IN BTU PER SQ FT PER DAY

CAL 1ST BANK		CORR. FACTOR AREA		CORR FACTOR GAS TO OIL		CORR FACTOR TITLE 24		TOTAL FOR HINES
100	x	1.11	x	1.11	x	0.90	=	111

b) MAXIMUM PEAK FUEL OIL CONSUMPTION, BTU (MILLIONS)

CAL 1ST BANK		CORR FACTOR AREA		CORR FACTOR GAS TO OIL		CORR FACTOR TITLE 24		
6.5		1.11	x	1.11	x	0.90	=	7.2

c) AVERAGE DAILY FUEL OIL CONSUMPTION, BTU (MILLIONS)

CAL 1ST BANK		CORR FACTOR AREA		CORR. FACTOR GAS TO OIL		CORR. FACTOR TITLE 24		
33	x	1.11	x	1.11	x	0.90	=	36.6

d) AVERAGE ANNUAL FUEL OIL CONSUMPTION, BTU (BILLIONS)

CAL 1ST BANK		CORR. FACTOR AREA		CORR FACTOR GAS TO OIL		CORR. FACTOR TITLE 24		
12	x	1.11	x	1.11	x	0.90	=	13.2

SKIDMORE, OWINGS & MERRILL
ARCHITECTS - ENGINEERS

ENGINEERING DEPARTMENT CALCULATIONS

BUILDING PROPOSED HINES OFF. BLDG S.F.	MADE BY HJM	DATE 15 JUL 76	JOB NO. 11437-[illegible]
SUBJECT MECHANICAL DATA FOR EIR	CHECKED BY	DATE	SHEET NO. 2 OF [illegible]

e) ENERGY REDUCTION FOR SUPPLY FANS - TITLE 24 HP

CAL 1ST BANK		CORR. FACTOR AREA	CORR. FACTOR TITLE 24	TOTAL HP
400	X	1.27	0.80	406

SKIDMORE, OWINGS & MERRILL
ARCHITECTS - ENGINEERS

ENGINEERING DEPARTMENT CALCULATIONS

BUILDING PROPOSED HINES OFFICE BLDG., S.F.	MADE BY EPLEE DATE 7/14/76	JOB NO. 11457-00X
SUBJECT ELECTRICAL DATA FOR E.I.R.	CHECKED BY J.S. DATE 7/15/76	SHEET NO. 1 OF 1

A. COMPARATIVE DATA:

	PROPOSED HINES BUILDING	CALIF. 1ST BANK	CORRECTIVE FACTOR
1. GROSS AREA:	386,100 S.F.	348,127 S.F.	+ 11%
2. NET RENT. AREA:	349,326 S.F.	247,441 S.F.	+ 27%
3. GROSS AREA PER FLR.:	13,440 S.F.	15,485 S.F.	-
4. NO. OF TYP. FLRS.:	28	20	

5. ESTIMATED ELECTRICAL CONNECTED LOAD:

	CAL. 1ST BANK		CORRECT. FACTOR		ADJUST FOR TITLE 24		TOTAL FOR HINES
a) LIGHTING:	1500 KW	X	1.27%	X	0.90%	=	1,710 KW

b) OTHER LOAD: 3000 KW X 1.27% = 3,800 KW (FOR EQUIP., ETC.)

c) TABULATION: (1710 KW) + (3800 KW) = 5,510 KW TOTAL FOR HINES

d) ALLOWANCE FOR TITLE 24 ON MECHANICAL EQUIPMENT LOAD REDUCTION:
100 H.P. X 1.27% = 127 H.P. = 127 KW

∴ 5,510 KW − 127 KW = 5,383 KW; SAY 5,400 KW GRAND TOTAL

6. ESTIMATED AVERAGE KWH USED PER MONTH: BASED ON 5.2 KWH/SQ.FT.*

a) APPROXIMATED FROM DAILY DEMAND CURVE CHART FOR 24 HRS. = 24,800 KWH
b) DAILY 24,800 KWH X 25 DAYS/MONTH = 620,000 KWH/MONTH

7. ESTIMATED AVERAGE KWH USED PER YEAR: 620,000 KWH X 12 = 7,440,000 KWH

8. ESTIMATED AVERAGE KWH USED PER MONTH PER SQ. FT.: 620,000 KWH ÷ 386,100 S.F. = 1.6 KWH

* DATA DERIVED FROM ACTUAL P.G.& E. CO. METER READINGS OF SEVERAL EXISTING LOCAL OFFICE BUILDINGS ADJUSTED FOR USE IN THIS PROJECT.